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ABSTRACT

An instructor's manual and student activity guide on electronics are provided in this set of prevocational education materials which focuses on the vocational area of trade and industry. (This set of materials is one of ninety-two prevocational education sets arranged around a cluster of seven vocational offerings: agriculture, home economics, distributive education, health occupations, world of work, trade and industry, and office occupations.) The instructor's guide is organized into the following elements: title of activity, duration of activity (eight to ten periods), activity goals, five instructional objectives, and activity implementation (description, materials needed, safety considerations, teacher preparation prior to class, during the class, follow-up activities, answer key to objective number 3, and a question sheet for duplication). The student activity guide provides step-by-step instructions (narrative and illustrations) for completing each instructional objective (e.g., recognize parts of a capacitor, assemble a proximity detector). At the end of each set of instructions is a student check point (evaluation activity). An occupational description for an electronics technician concludes the document. (JH)

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ED169360

T & I – ELECTRONICS

Kit No. 71

INSTRUCTOR'S MANUAL

Prepared by

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State Department of Education
Office of Vocational Education
Prevocational Education
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In Cooperation With

Vocational Education Media Center
Clemson University
Clemson, South Carolina 29631

1978

CE 020 545

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TITLE OF ACTIVITY

Kit No. 71, T & I – Electronics

DURATION

Main Activity: 6 – 7 periods
Follow-up Activity: 2 – 3 periods

GOALS

The student will learn to recognize various electronics components.

The student will learn to read the color coding on resistors in order to determine the tolerance.

The student will learn the value in following instructions carefully.

In constructing the project, the student will begin to understand how these groups of components work together to convey messages.

INSTRUCTIONAL OBJECTIVES

The student will recognize parts of a capacitor.

The student will recognize the SCR and state the purpose for using it.

The student will recognize a resistor and, by examining its color bands, will indicate the number value of the resistor.

The student will assemble a project.

The student will decide what the project does by completing the final steps.

VOCATIONAL CLUSTERS

None

ACTIVITY IMPLEMENTATION

A. Activity Description

This activity is done on an individual basis, at the student's own pace. Part I consists of learning to recognize some components and to read the color coding on resistors. Part II will be a project and instructions for one of the five projects offered. There are five of each of the projects. The student will put the project together and then discover just what the finished project does.

B. Safety

Students are using electricity, therefore, components should not be touched when the project is connected to an electrical source.

Plastic cover must be in place before operating project.

C. Materials Required

1. Audio Visual Equipment:

   None

2. Technical Equipment:

   5 Proximity detectors 810-PD
   5 Decision makers 808-DM
   5 Reflex testers 830-RT
   5 Variable strobe lights 840-SL
   5 Whooper burglar alarms 850-WH

3. Expendable Materials:

   5 apples
   5 batteries, 9V
   1 radio or lamp

D. Preparation Prior to Class

Familiarize yourself with Part I, particularly the third objective on how to read the color coding on resistors. While the directions are simple and complete, you may need to help some student understand it better.

An answer key is provided in your manual for you to see if students have correctly answered the three problems in Part I. Check these and then instruct the student to get started on the project.

Have projects available on a table the second day.

E. During Class Session

Introduction

What is an electronic device? What is the difference in electronics and electricity? (Allow time for answer.) Electricity is a power source. Electronics means that you use electricity to convey a message – television, radio, CB's, radar, telegraph, IBM machines. (Discuss if the class is interested and if you feel comfortable with the subject of how these and other things convey a message.)

We are going to put together some projects this week that convey a message. If you follow the directions carefully, you'll soon find out just what your electronic project does!

This is a learning activity – you'll learn the names of some components and their uses. This is also a fun activity – it will be fun to see just what you can make this handful of parts do when put together in the right way. Note to Teachers: The whooper alarm No. 850 and the reflex tester projects are more difficult. The proximity switch is the simplest. You may want to make recommendations to students as to which project they should use or you may wish to assign all projects.

F. Follow-up Activities

1. Have each student complete a VIEW Fact Sheet.
2. Find out from electronics magazines and ads from electronics stores just what kind of projects are available – what kinds of things can you put together?
3. Plan a trip to an electronics manufacturing plant if one is located in your area.
4. Cut out ads for jobs in the electronics field – note salaries and location of jobs, education required.
5. Write or explain how a message was conveyed by the student's project. What was the message?

ANSWER KEY

Checkpoint – Instructional Objective III

A. 2,350.00
49,350
44,650
44,650 – 49,350

B. 15,000.00
165,000
135,000
135,000 – 165,000

C. 28,000.00
308,000
252,000
252,000 – 308,000

MASTERS FOR DUPLICATION

VIEW Fact Sheet

VIEW FACT SHEET

NAME _____ CLASS _____ OCCUPATION _____

A. List the advantages (good points) of this occupation (job).

B. List the disadvantages (bad points) of this occupation (job).

C. List three things you should know to do this occupation (job).
1.
2.
3.

D. What type of education should you get to be prepared (do) for this occupation (job)?

E. What courses must you take to go into this occupation (job)?

F. What do you think your future in this occupation (job) will be?

G. What wage can you expect in this occupation (job)?

H. What are the working hours of this occupation (job)?

I. To learn more about this occupation (job), write to:

J. Using a scale of 1 to 5, circle the number that measures your interest in this occupation (job) as a possible career.

I don't like it. 1 2 3 4 5 I like it.

T & I – ELECTRONICS

Kit No. 71

STUDENT

LEARNING ACTIVITY GUIDE

Prepared by

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State Department of Education
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T & I – ELECTRONICS

INTRODUCTION

Why do you want to study electronics? Maybe you plan to find a job as an electronics technician, or selling electronics parts. Perhaps you want to work for the telephone company or at a radio or television station.

But then, maybe the job for you has nothing to do with electronics. So you don't need electronics! Wait a minute! Do you have a TV set, a telephone, a stereo set? What about a CB radio or a tape recorder?

Sure you have these things, or you'd like to. They are electronic devices. That means they use electricity to carry messages. They may be a part of your job, or they may be a part of your leisure time. Either way, it will be to your benefit to know something about the components and tools used, and why and how electronic devices work.

In this unit we will work with some electronic devices that do surprising things! You'll have to read on if you want to find out more.

GOALS

The student will learn to recognize various electronics components.

The student will learn to read the color coding on resistors in order to determine the tolerance.

The student will learn the value in following instructions carefully.

In constructing the project, the student will begin to understand how these groups of components work together to convey messages.

DIRECTIONS

Follow the programmed text and directions step by step.

There are checkpoints at various places. They will help you to see if you have followed the instructions to that point.

When you have completed the project you will have an electronics project that does something surprising. Enjoy trying it out!

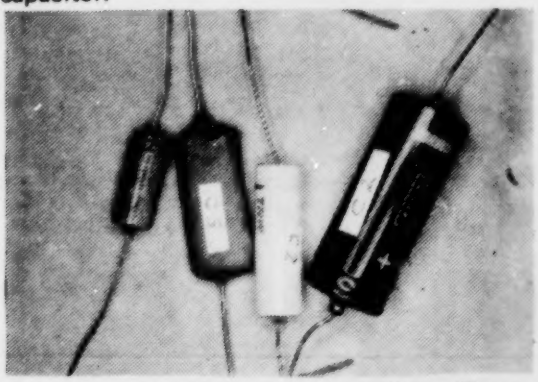
Then carefully disassemble the project. Treat the components with care so that they can be used again and again.

MATERIALS

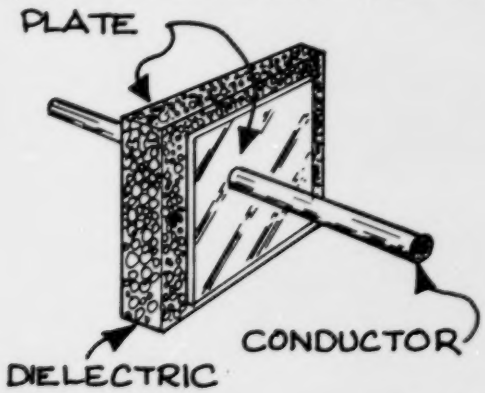
1 set of parts for a project

Instructional Objective 1

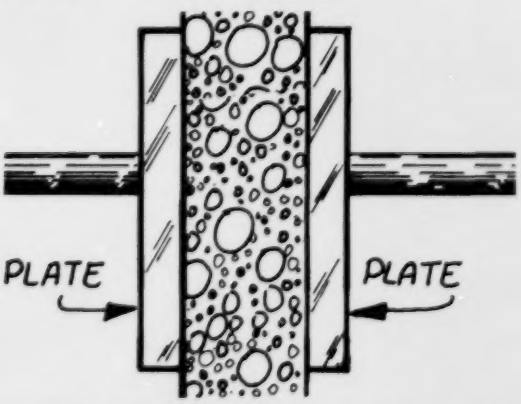
The student will recognize the parts of a capacitor.



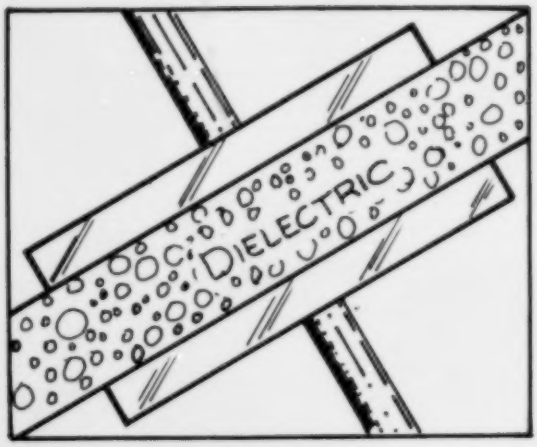
STEP 1 – All of these are capacitors. There may be a capacitor in the project you will use.



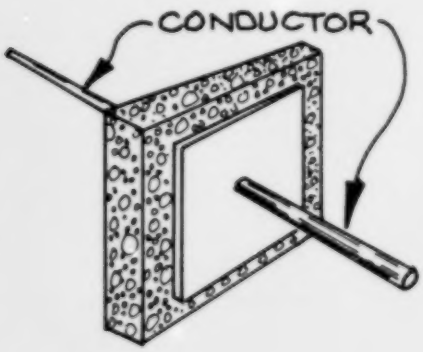
STEP 2 – Capacitors look different, but they are all made of the same parts.



STEP 3 – There are at least two plates – they are surfaces on which electrons accumulate.



STEP 4 – The dielectric is between the plates – this is any material that insulates. It may be air, wood, mica, plastic, rubber, paper or oil.



STEP 5 – The conductor is where electrons enter and leave the plates.

STEP 6 – The purpose of the capacitor is to oppose change in circuit voltage. It tries to maintain a steady voltage.

Check Point

What is a plate?

Name at least three materials a dielectric can be made of.

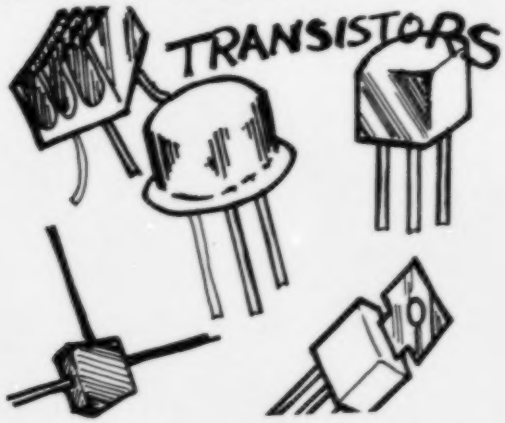
What does the capacitor do?

Now review the steps of this objective to see if you got the right answers.

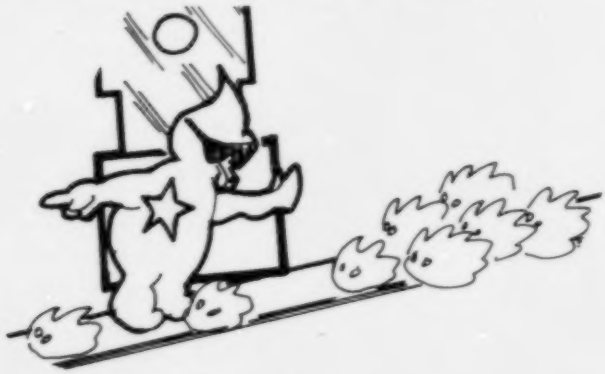
Instructional Objective II

The student will recognize the SCR and state the purpose for using it.

STEP 1 – This is a SCR.



STEP 2 – The SCR is a type of transistor.



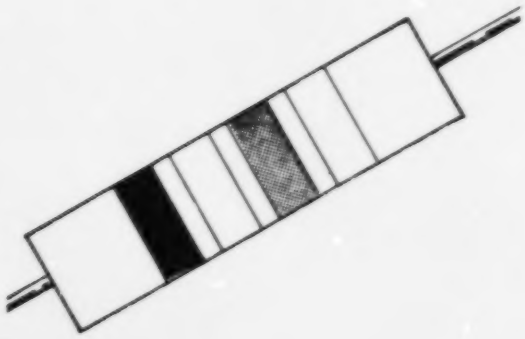
STEP 3 – The way it works is simple. It waits until a certain voltage is reached, then it lets the voltage through to operate the project. It doesn't take long.

CHECKPOINT

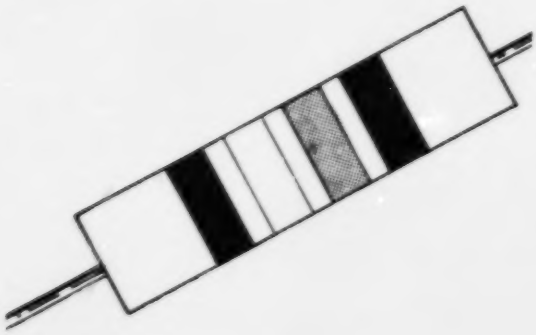
How does the SCR work?
Check your answer with step 3.

Instructional Objective III

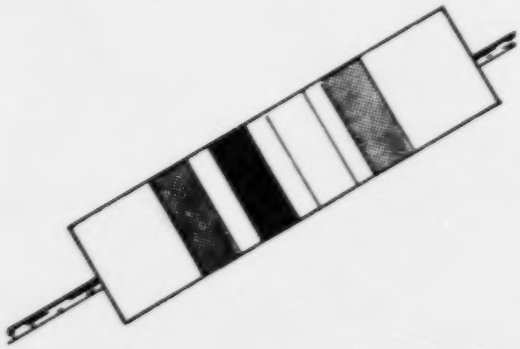
The student will recognize a resistor and, by examining its colored bands, will indicate the number value of the resistor.



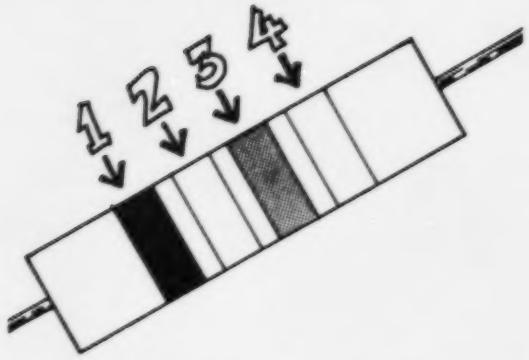
STEP 1 – This is a resistor. It has bands of color.



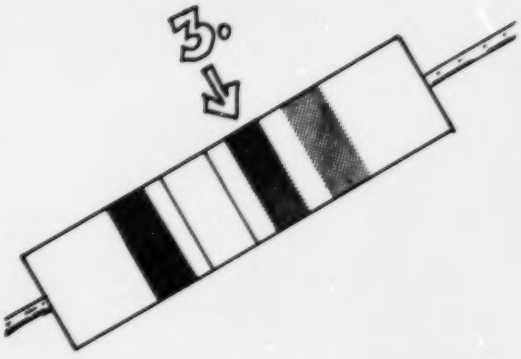
STEP 2 – These bands have meaning – if you learn what the colors stand for, you will know the number value of the resistor.



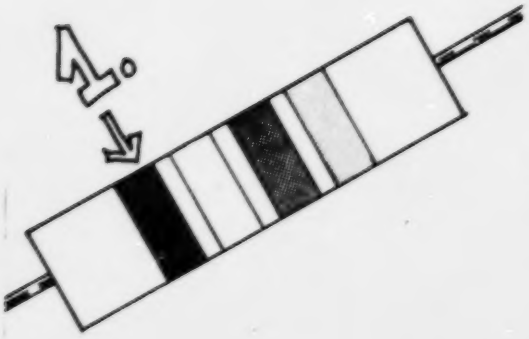
STEP 3 – The resistors are marked with color bands because they are too small to mark with numbers or letters.



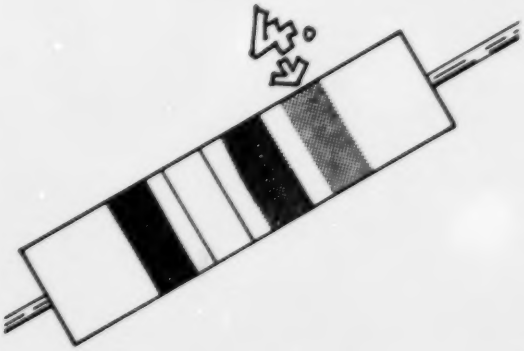
STEP 4 – There are four bands on a resistor.



STEP 7 – Band No. 3 indicates the multiplier. This means the number of zeros.



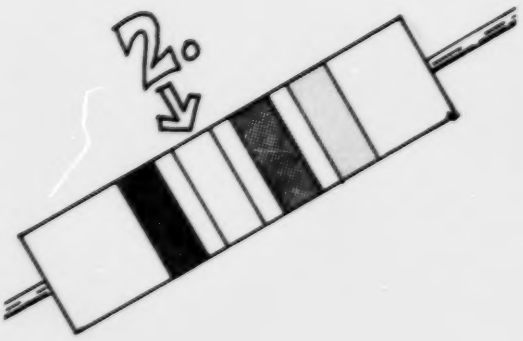
STEP 5 – Band No. 1 indicates the first digit of the number.



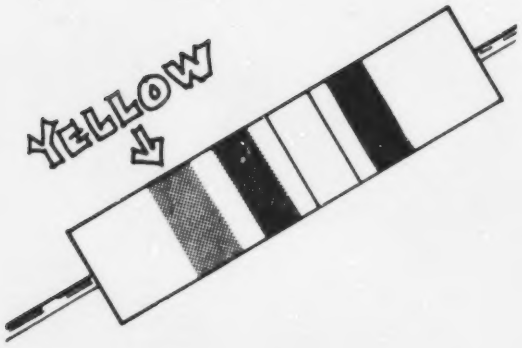
STEP 8 – Band No. 4 is either gold or silver and indicates the tolerance.

STEP 9 – Color code used for numbers.

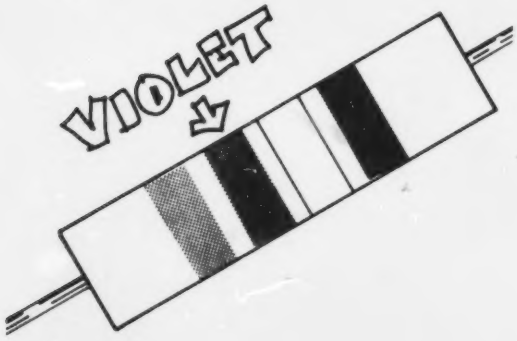
0 = Black
1 = Brown
2 = Red
3 = Orange
4 = Yellow
5 = Green
6 = Blue
7 = Violet
8 = Gray
9 = White



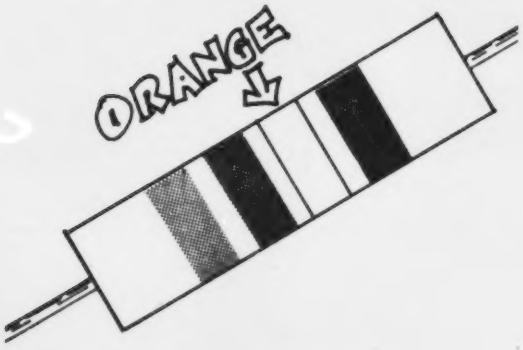
STEP 6 – Band No. 2 indicates the second digit of the number.



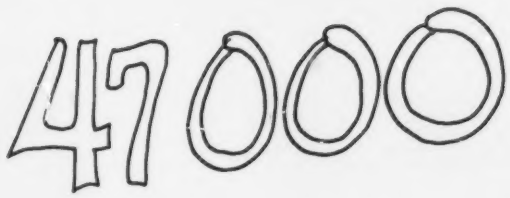
STEP 10 – Now suppose the first band is yellow. Find the number that corresponds to yellow. It is 4. Band No. 1 is 4.



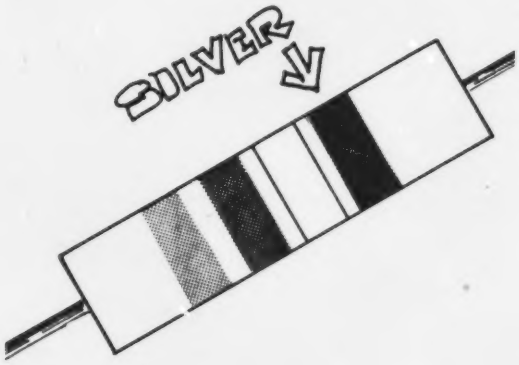
STEP 11 – Band No. 2 is violet. Find the number that goes with violet. The number is 7. The second band number is 7.



STEP 12 – The third band is orange. Find the number that goes with orange. The number is 3.



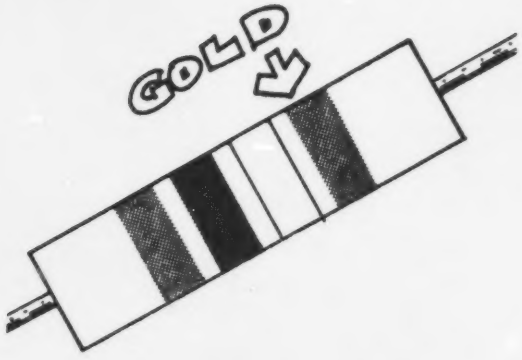
STEP 13 – Add 3 zeros to the end of the number you have already, now the number is 47000.



STEP 14 – If band No. 4 is silver, then the resistor has a span of plus or minus 10% of its value.

47000	47000
+4700	–4700
51700	42300

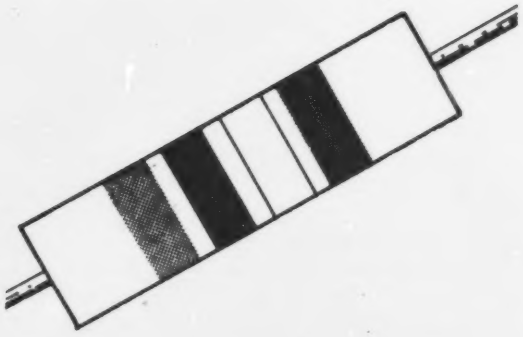
So, the resistor has a value of anywhere between 42,300 and 51,700.



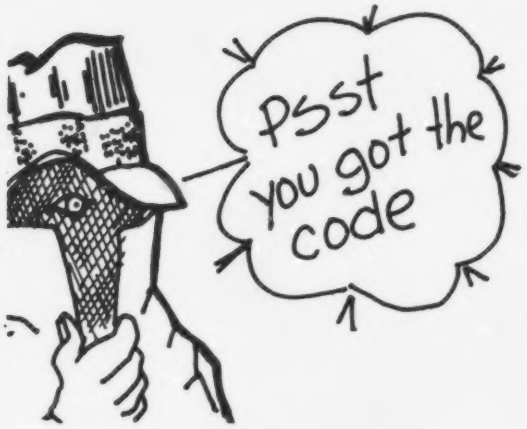
STEP 15 – If the fourth band is gold, then the value of the resistor is plus or minus 5%.

47000	47000
+2350	– 2350
49350	44650

So, the resistor has a value of anywhere between 44,650 and 49,350.



STEP 16 – Let's go over the steps again.
Band No. 1 – First number
Band No. 2 – Second number
Band No. 3 – Number of zeros
Band No. 4 – Tolerance



STEP 17 – Here is the color code again.
0 = Black
1 = Brown
2 = Red
3 = Orange
4 = Yellow
5 = Green
6 = Blue
7 = Violet
8 = Gray
9 = White

Check Point

Here is a quiz to see if you can use the information you've just had. Look at each problem and find the value for each resistor. After you finish, go to your instructor and check your work.

A. Band No. 1 Yellow
Band No. 2 Violet
Band No. 3 Orange
Band No. 4 Gold

B. Band No. 1 Brown
Band No. 2 Green
Band No. 3 Yellow
Band No. 4 Silver

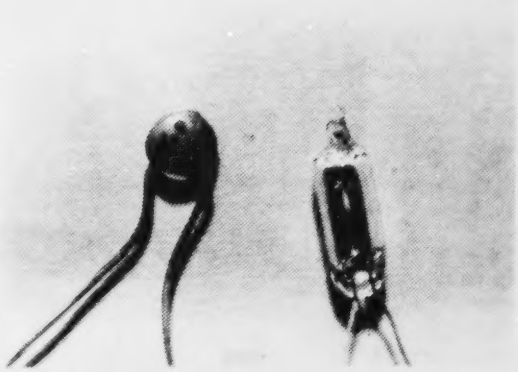
C. Band No. 1 Red
Band No. 2 Gray
Band No. 3 Yellow
Band No. 4 Silver

PROXIMITY DETECTOR

No. 810 PD

Instructional Objective IV

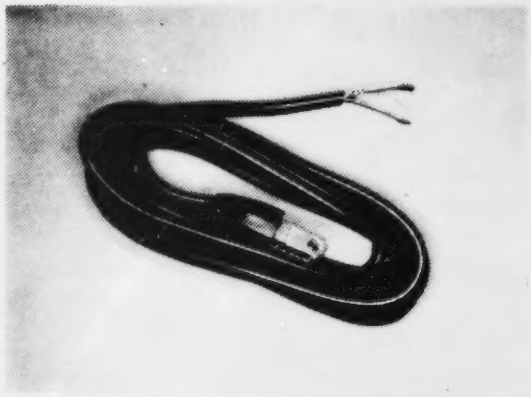
The student will assemble the proximity detector.



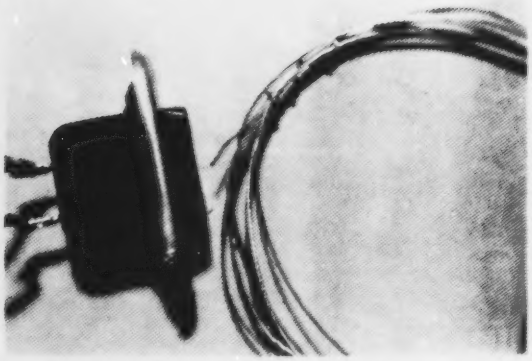
STEP 1 — These are the parts in project No. 810 PD.

Parts List

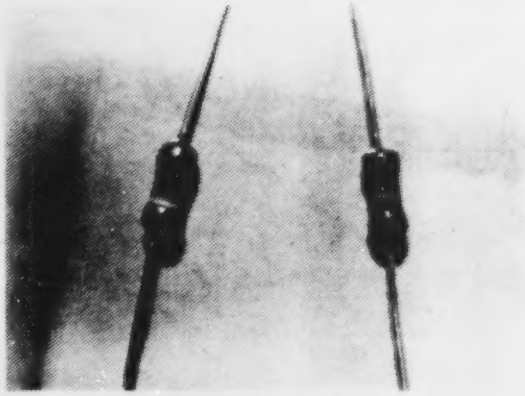
C_1 = 10 to 20 pf capacitor
I_1 = NE -2 neon lamp



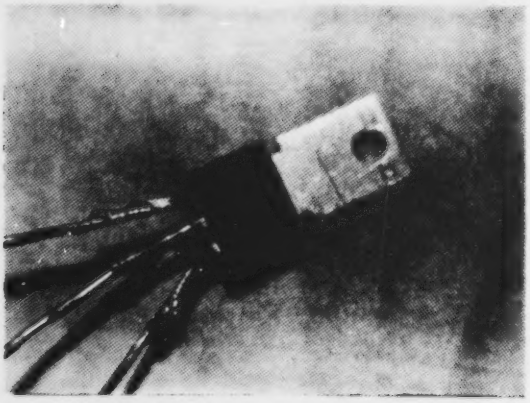
P_1 = line cord



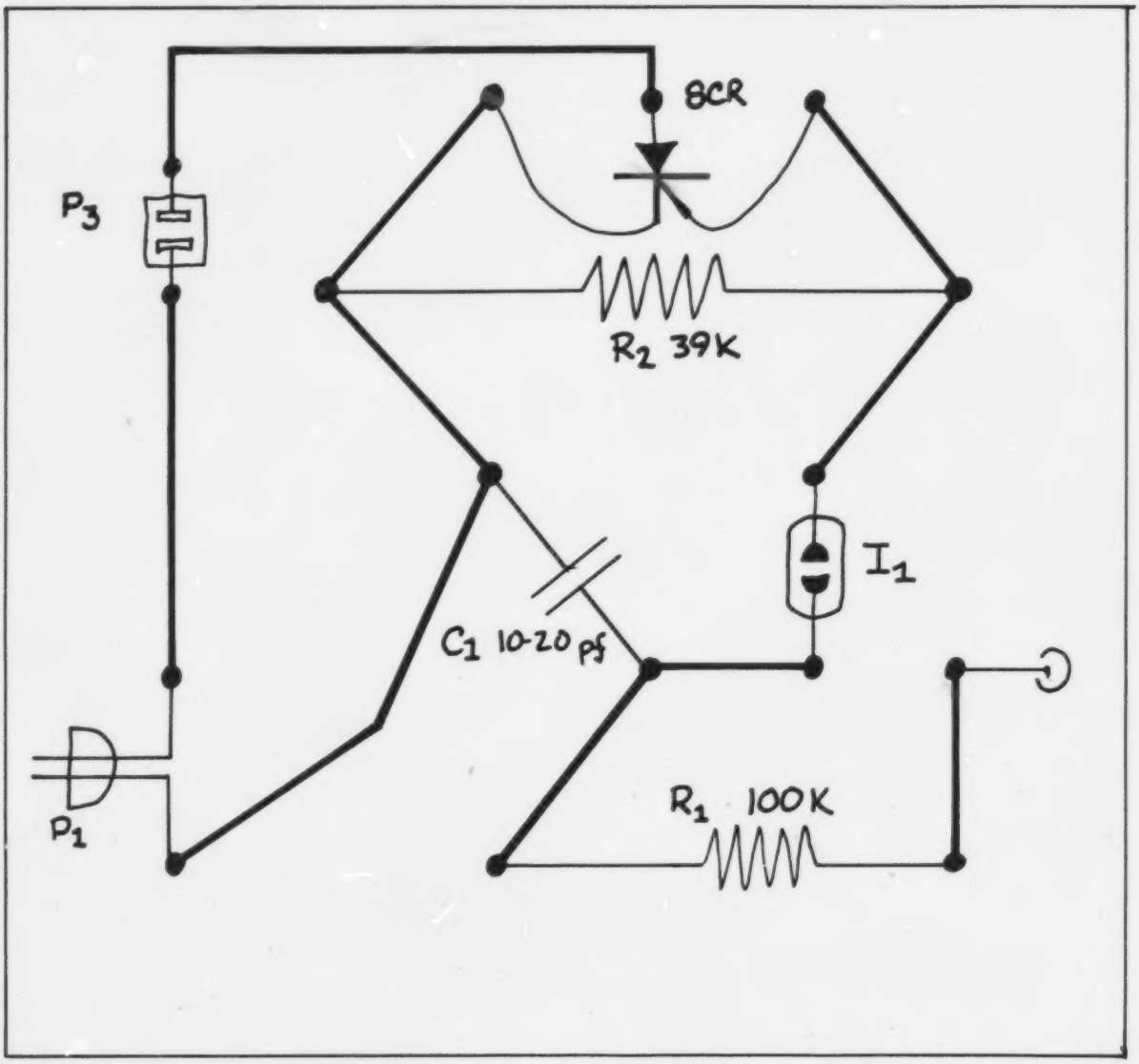
P_2 = 5 foot (1.524 m) piece of wire
P_3 = convenience outlet



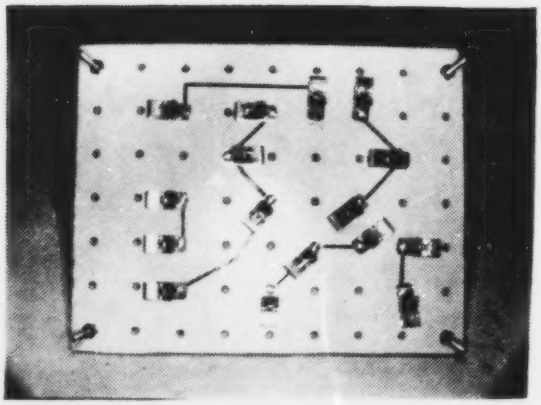
R_1 = 100 K resistor (100,000)
R_2 = 39 K resistor (39,000)



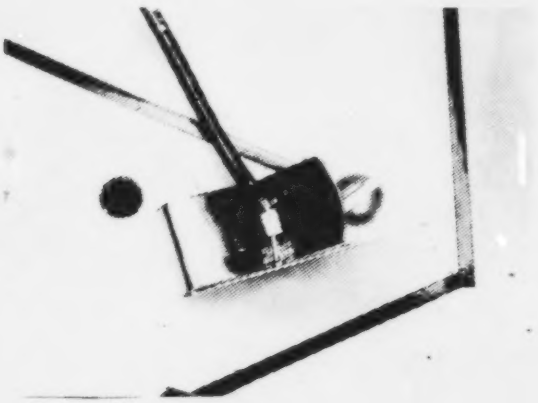
SCR (106B1)



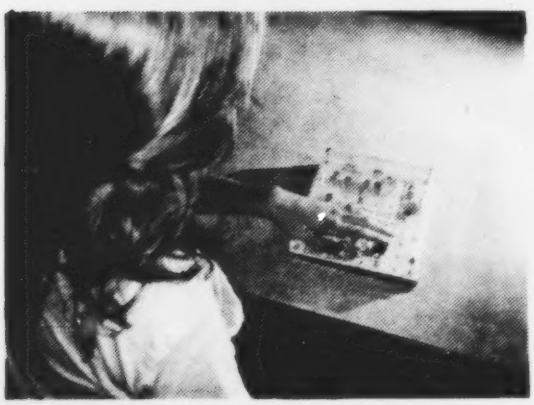
STEP 2 – This is the schematic for project 810PD. This means a picture of where all the parts are located in relation to one another.



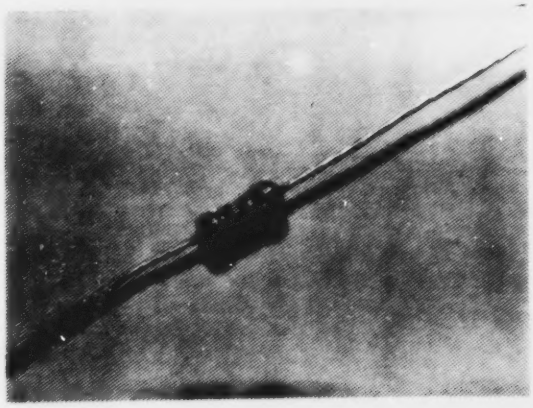
STEP 3 – This is the circuit board. Locate the one like it in your project.



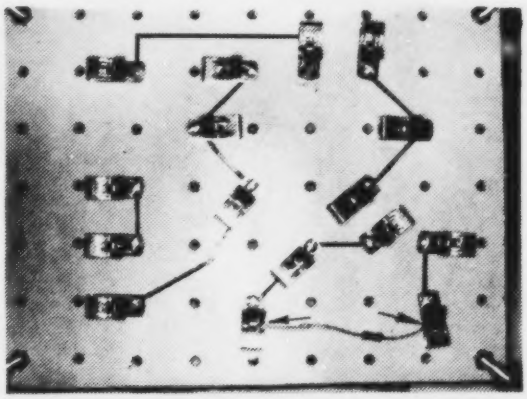
STEP 4 – Notice the spring clips located in several places. These will be used to hold the components so that they make contact with the circuit board.



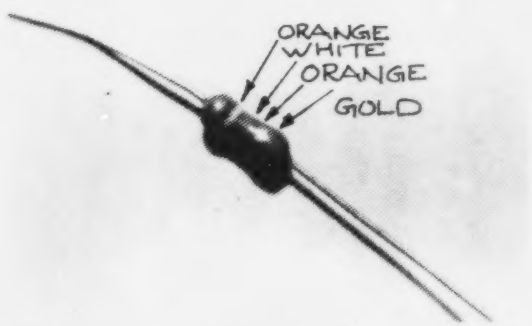
STEP 5 – Let's get started!



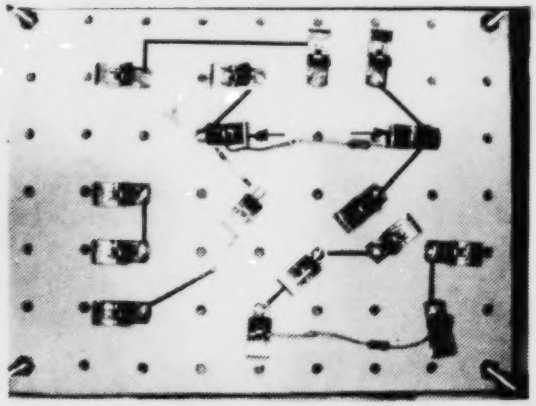
STEP 6 – Locate the 100 K resistor by looking at its bands and determining the value. The K means multiply by 1000. So 100 K means 100 x 1,000, or 100,000.



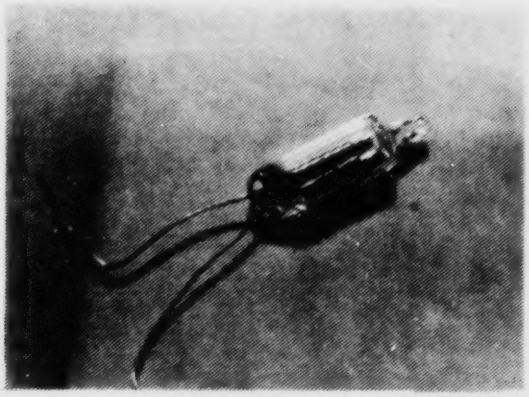
STEP 7 – Use spring clip to insert ends of resistor in place. Be sure yours looks the same as the illustration.



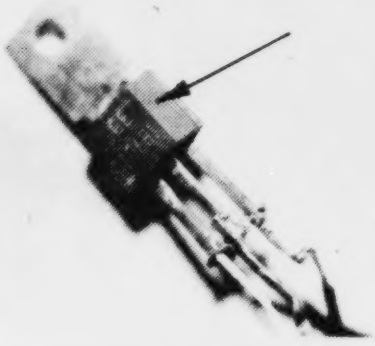
STEP 8 – Locate the 39 K resistor. Remember K means multiply by 1,000. 39 x 1,000 = 39,000.



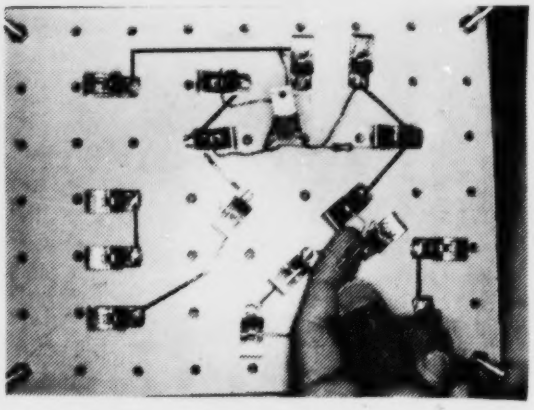
STEP 9 – Position the 39 K in the clips just as is done in the illustration.



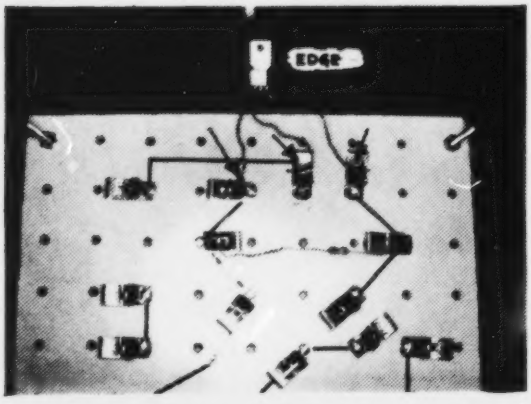
STEP 12 – Find the NE 2 neon lamp.



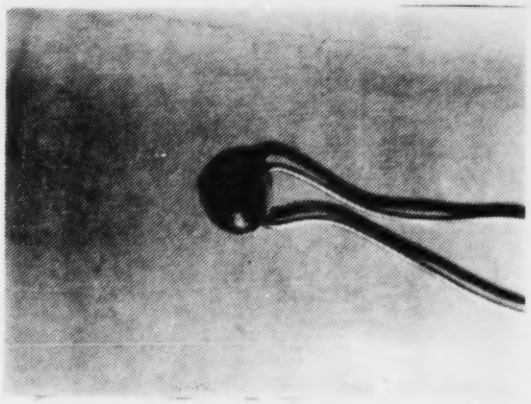
STEP 10 – Locate the SCR – remember what it looks like from Objective II. Notice the corner that looks as if it has been cut off.



STEP 13 – Clip in place the neon lamp as shown.

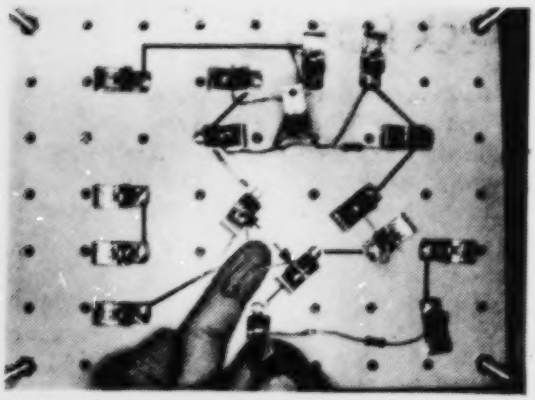


STEP 11 – Put the three prongs in the clips as shown. Keep the beveled edge in position shown.

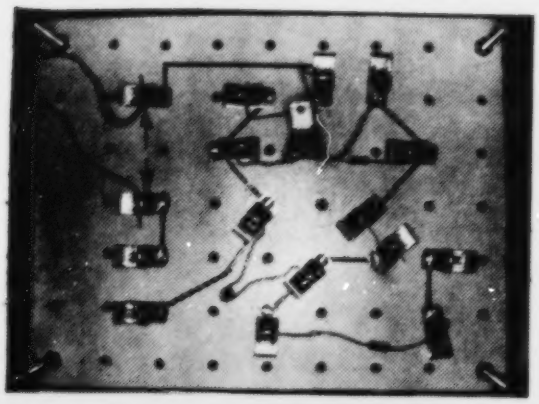


STEP 14 – Locate the capacitor.

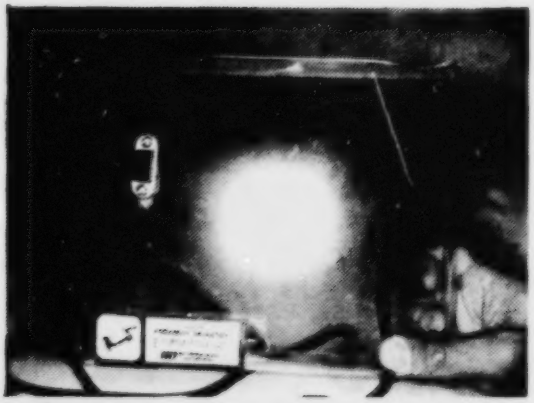
19



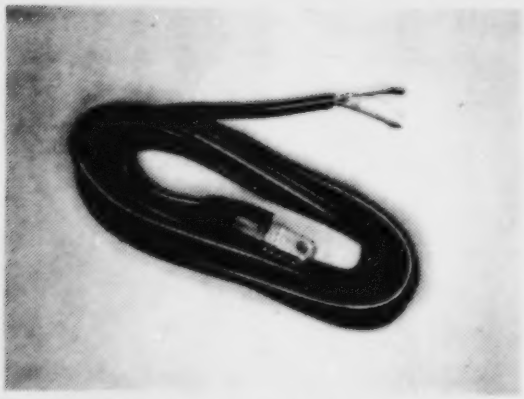
STEP 15 – Clip capacitor in place.



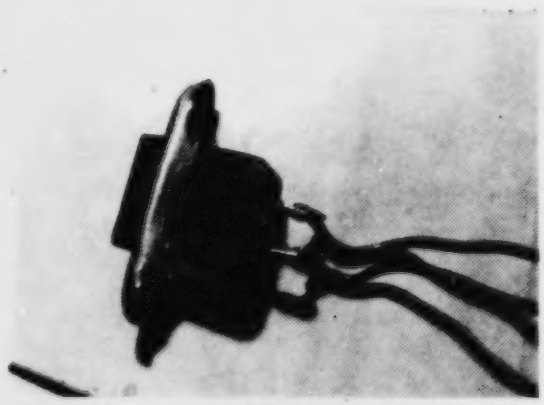
STEP 18 – Clip these wires in place as indicated in the drawing.



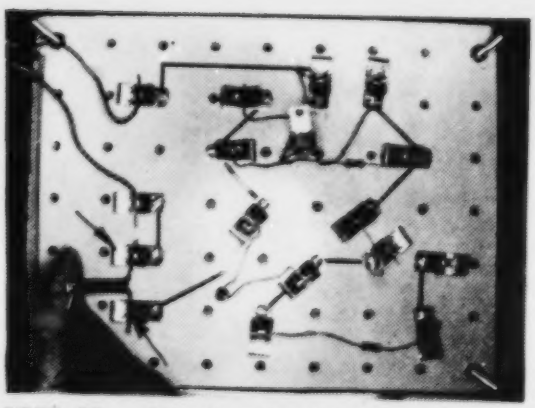
STEP 16 – Locate the plastic cover.



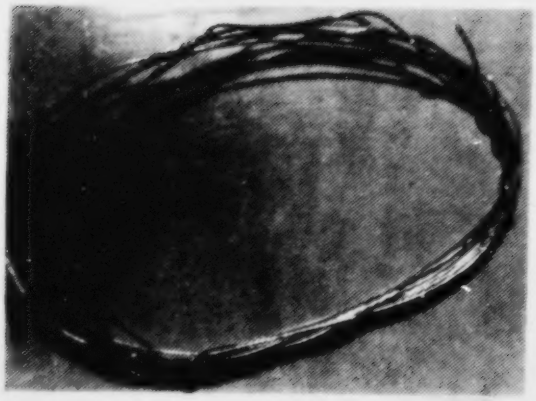
STEP 19 – Note the line cord.



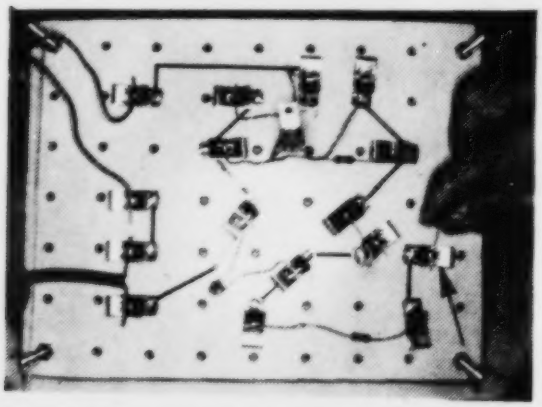
STEP 17 – Note the convenience outlet. There are two wires attached.



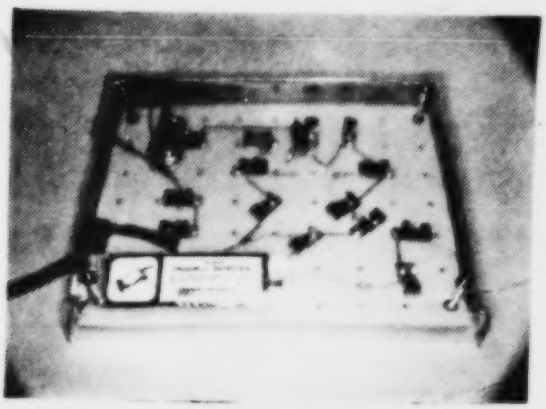
STEP 20 – Clip the wires in place as shown.



STEP 21 – Locate the five foot (1.524 m) piece of wire.



STEP 22 – Spring clip the wire in place.



STEP 23 – Place the plastic cover in place as shown.

Check Point

Have you used all the components?

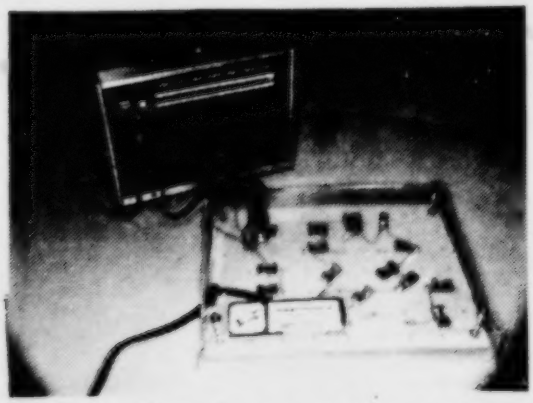
Are they all in place securely?

Are they in the correct place? Look at the last picture of the circuit board and check.

Have your instructor check your placement of the components.

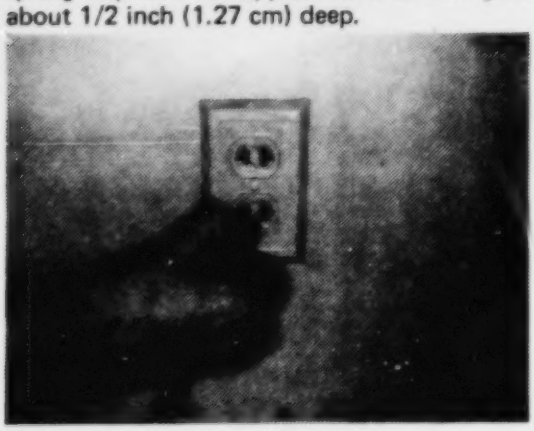
Instructional Objective V

The student will decide what the proximity detector does.



STEP 1 – Plug in the cord from a light or radio to P_1. Be sure to turn the light or radio on first.

STEP 2 – Stick the end of the wire from the spring clip into an apple. Make sure it goes about 1/2 inch (1.27 cm) deep.



STEP 3 – Plug P_1 into a wall socket.

STEP 4 – Touch the apple.

STEP 5 – If everything is in the right place, the light or radio will come on. If it doesn't, unplug P_1 from the socket, turn the plug so the prongs go in different openings from the first time.

STEP 6 – If it still doesn't work, recheck your project for proper connections after unplugging the line cord.

Check Point

Did your proximity detector work?

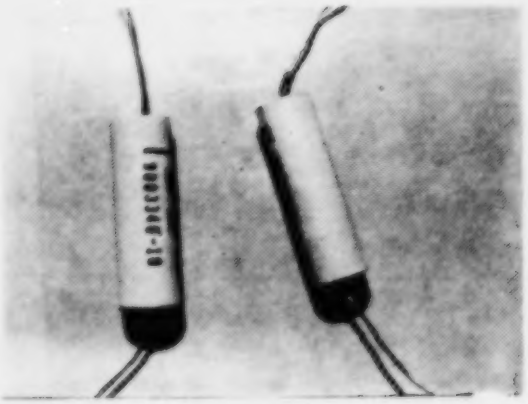
Did you check to see if all instructions were followed?

Was the SCR in the right position?

Was the cord plugged into the wall socket correctly?

Instructional Objective IV

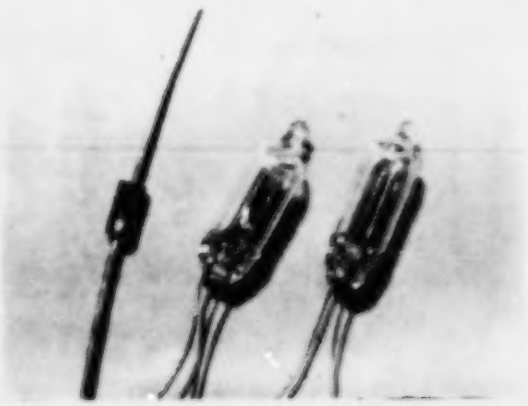
The student will assemble the decision maker.



STEP 1 – These are the parts in project 808 DM.

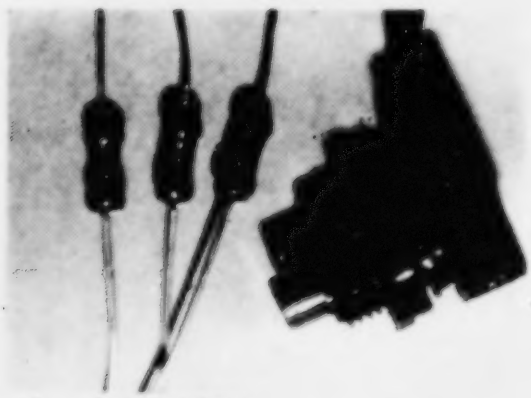
Parts List

C_1 = .22 to .47 mfd capacitor
C_2 = .22 to .47 mfd capacitor

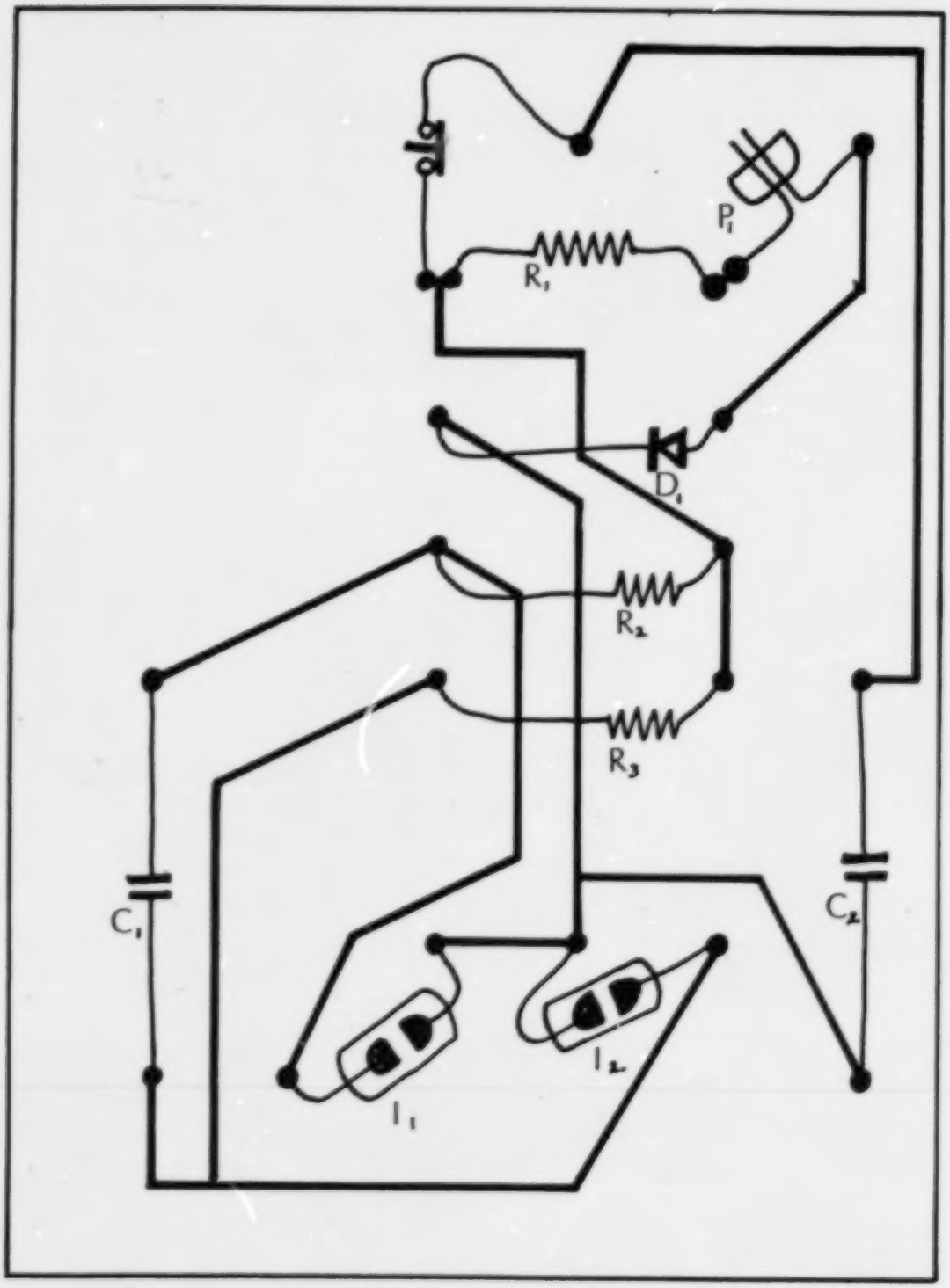


D_1 = 100 PIV diode
I_1 = NE2 neon lamp
I_2 = NE2 neon lamp

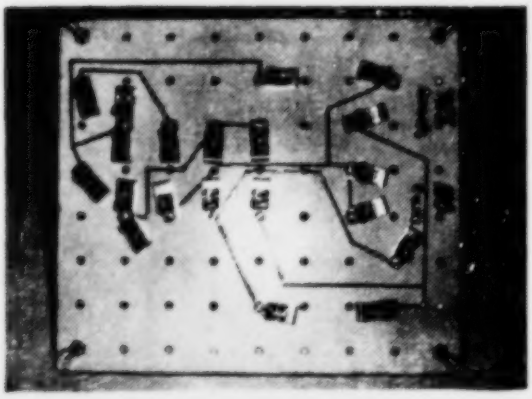
P_1 = AC line cord and plug



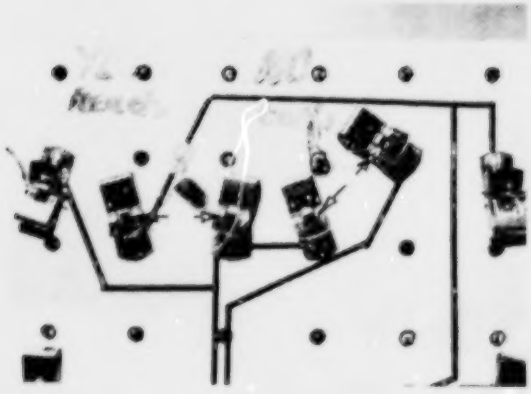
R_1 = 1 meg resistor
R_2 = 100 K resistor
R_3 = 100 K resistor
S_1 = SPST switch



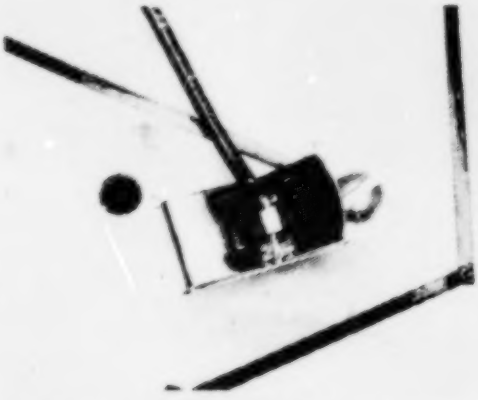
STEP 2 – This is the schematic for project 808 DM. This means a picture of where all the parts are located in relation to one another.



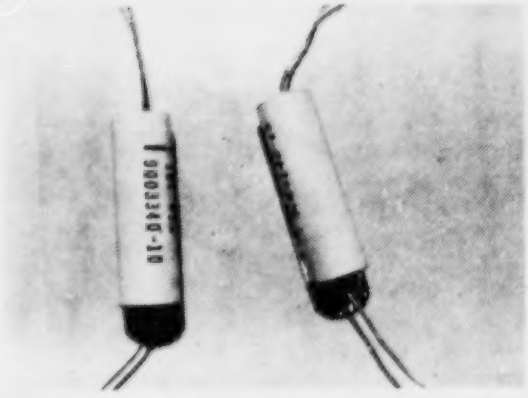
STEP 3 – This is the circuit board. Locate one like it in your project.



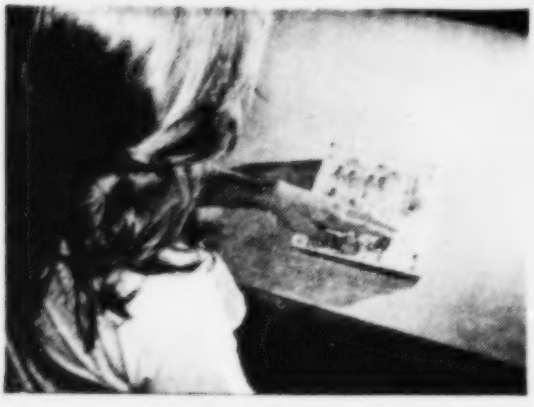
STEP 6 – Find the two N_2 neon lights. Clip them in place as on the illustration.



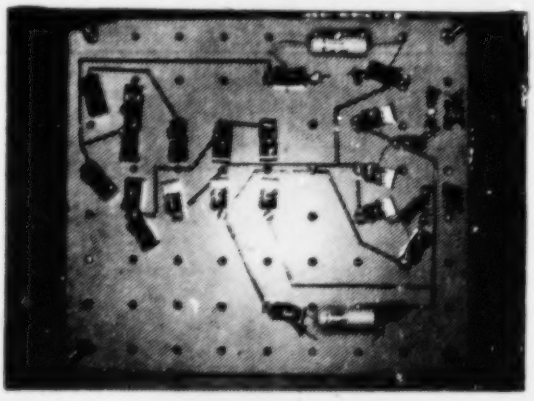
STEP 4 – Notice the spring clips located on the board. These will be used to hold the components so that they make contact with the circuit board.



STEP 7 – Find the two .22 mf – .47mf capacitors.

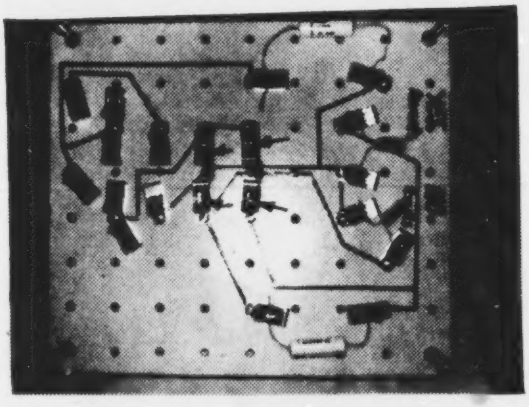


STEP 5 – Let's get started!

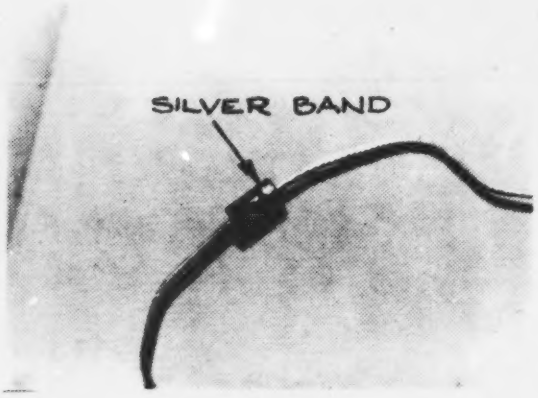


STEP 8 – Clip the capacitors in place as shown.

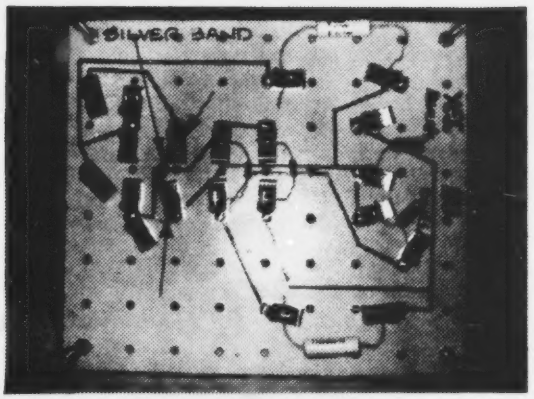
STEP 9 – Find the two 100 K resistors (K means multiply x 1000) 100 x 1000 = 100,000.



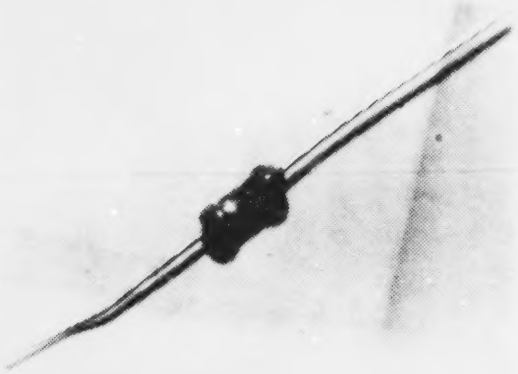
STEP 10 – Clip the resistors in place as shown.



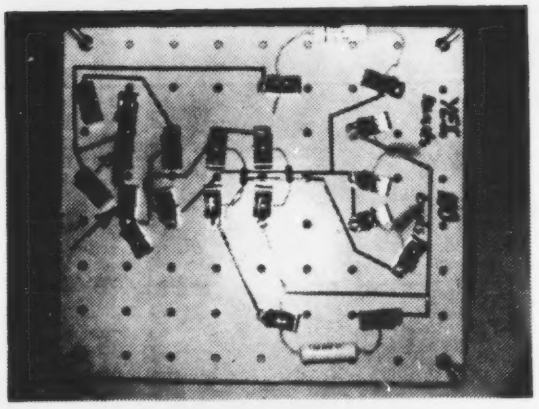
STEP 11 – Locate the diode in your project. Notice a silver line on one end.



STEP 12 – Put the diode in place as shown. Be sure the silver line is on the proper side.

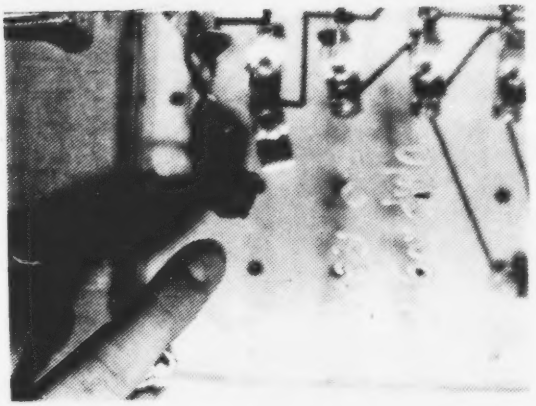


STEP 13 – Locate 1 meg. resistor.

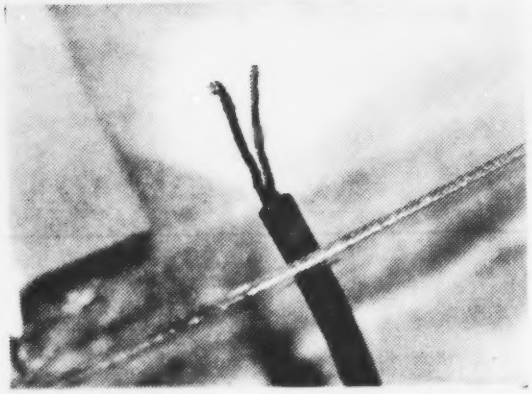


STEP 14 – Clip in place as shown.

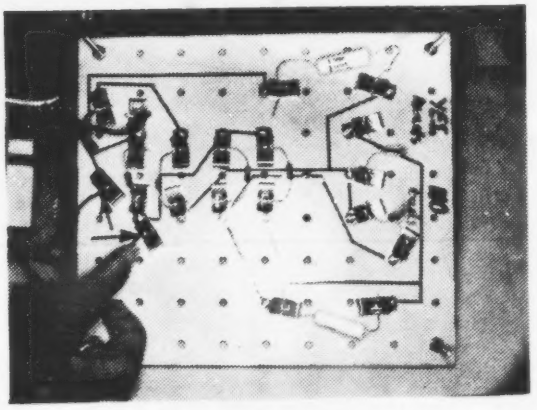
STEP 15 – Locate the plastic cover.



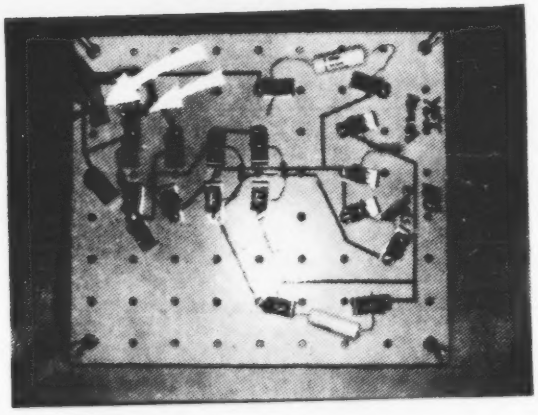
STEP 18 – Locate SPST switch.



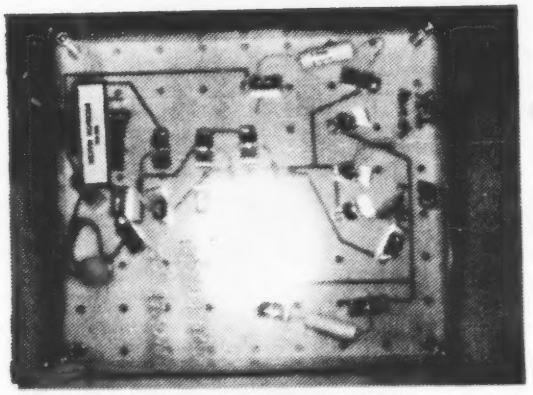
STEP 16 – Locate AC line cord with plug. Insert through plastic cover.



STEP 19 – Clip switch wires in place.



STEP 17 – Clip cord in place as shown.



STEP 20 – Place the plastic cover in place as shown.

Check Point

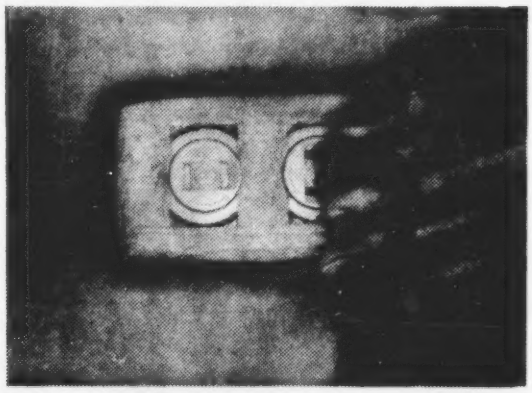
Have you used all the components in your project?

Does your finished project look exactly like the drawing?

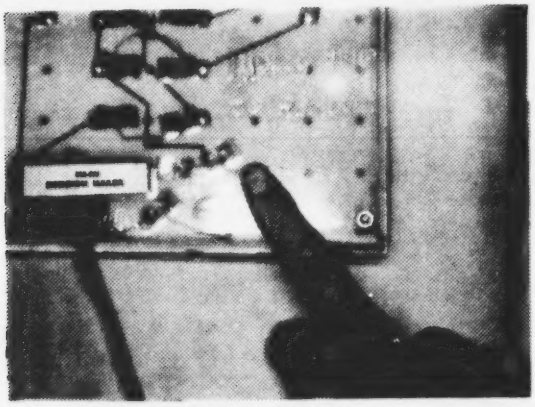
Have your instructor check your placement of the components.

Instructional Objective V

The student will decide what the decision maker does.



STEP 1 – Plug the socket into an electrical outlet.



STEP 2 – Press the switch – both bulbs will light up.

STEP 3 – Release the switch – only one bulb will remain lit.

STEP 4 – Let one bulb be heads or yes; let the other be tails or no.

STEP 5 – Ask a friend questions, get the answers by pressing the button and releasing. Or have someone choose heads or tails – let the project give the answer. Make up a game if you have time.

Check Point

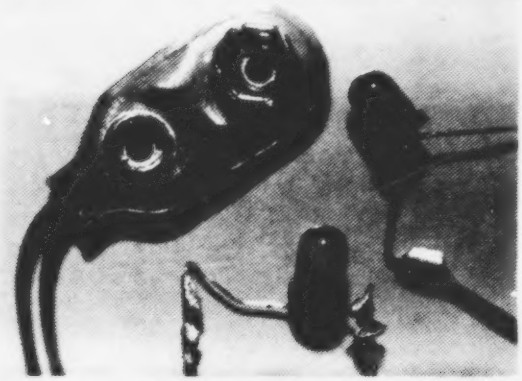
Did it work?

Did you check to see if all parts are properly placed?

Is it plugged in?

Instructional Objective IV

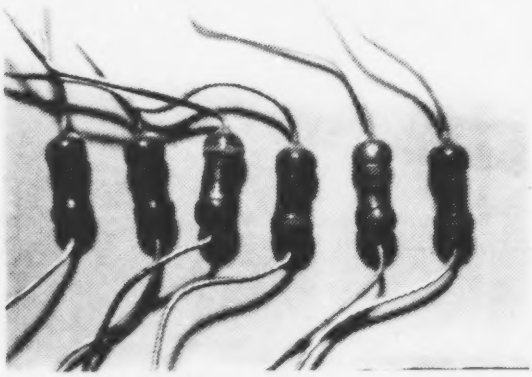
The student will assemble the reflex tester.



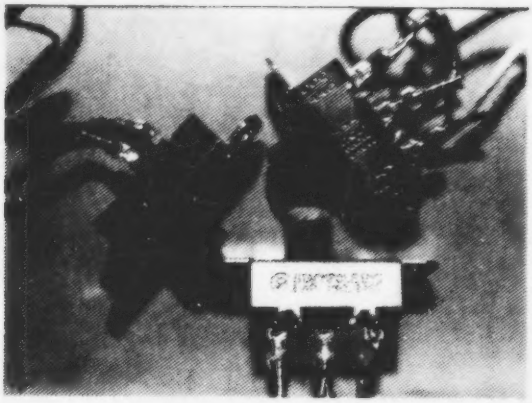
STEP 1 — These are the parts in project 830RT.

Parts List

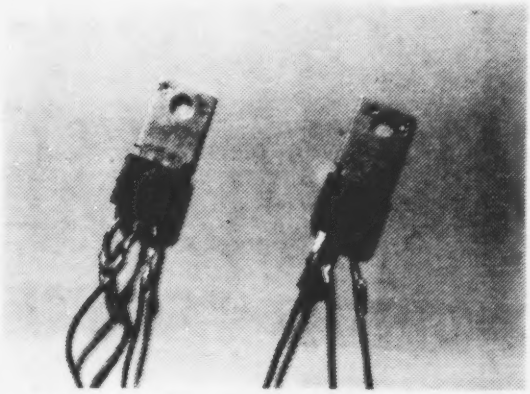
B_1 = 9V battery clip
D_1 = LED
D_2 = LED



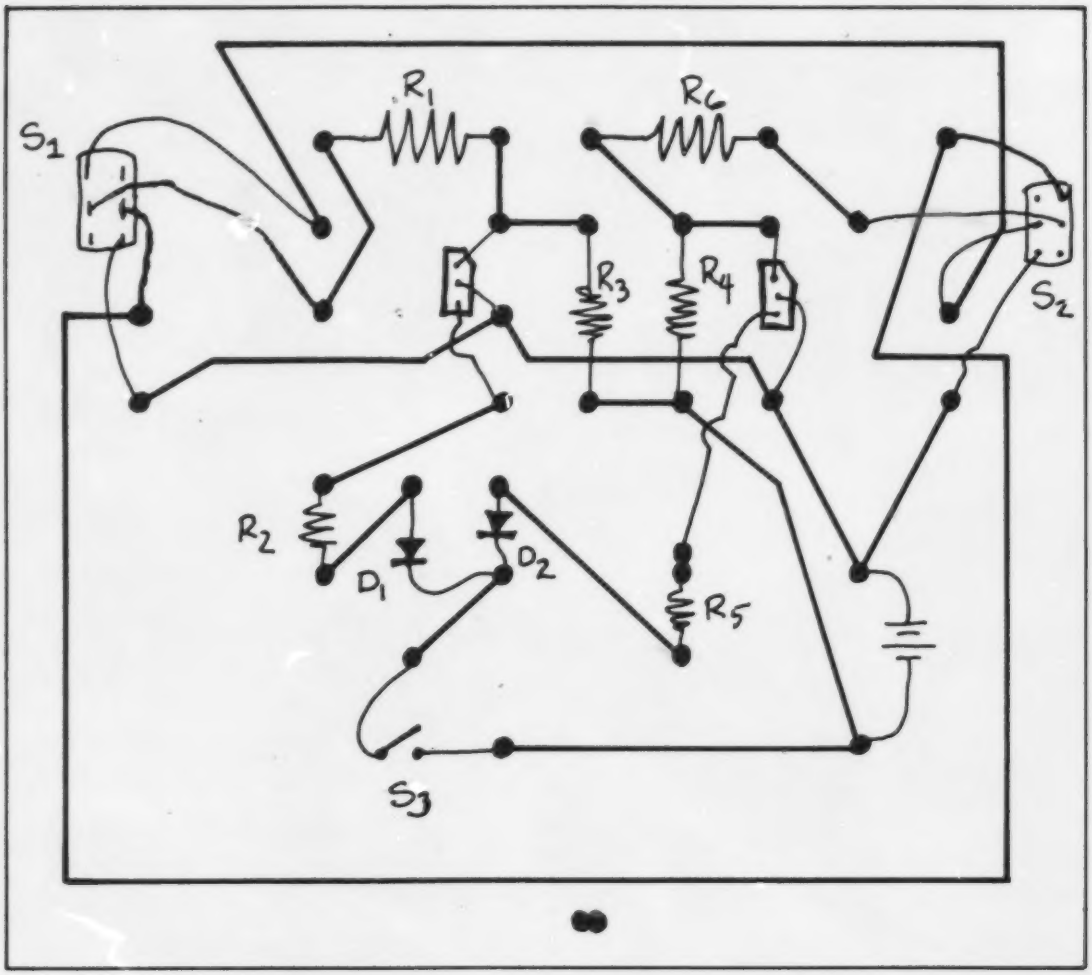
R_1 = 2.7K resistor
R_6 - 2.7K resistor
R_2 = 470 OHM resistor
R_5 = 470 OHM resistor
R_3 = 1 M OHM resistor
R_4 = 1 M OHM resistor



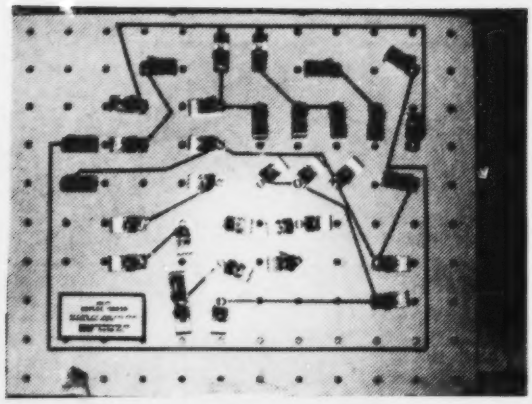
S_1 = DPDT switch
S_2 = DPDT switch
S_3 = SPST switch



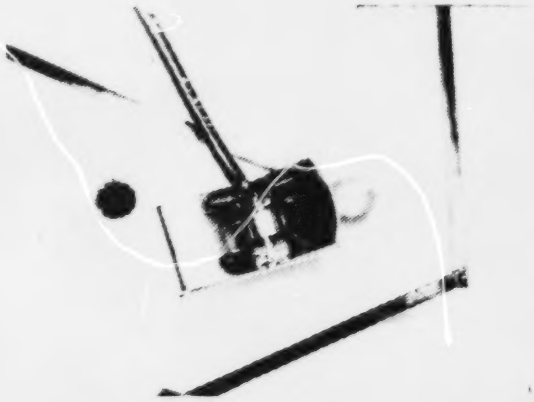
SCR_1 = C106B
SCR_2 = C106B



STEP 2 – This is the schematic for project 830RT. This means a picture of where all the parts are located in relation to one another.

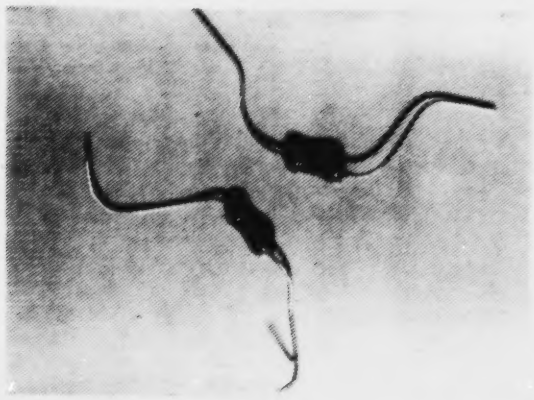


STEP 3 – This is the circuit board. Locate one like it in your project.

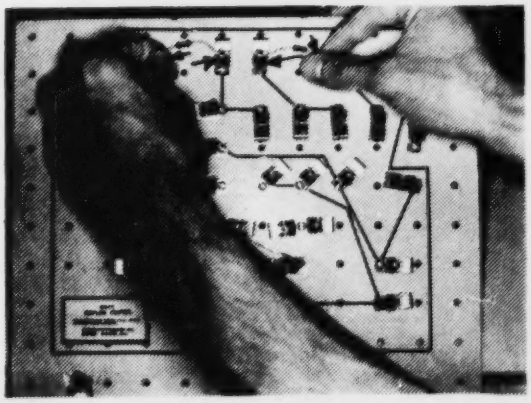


STEP 4 – Notice the spring clips located on the board. These will be used to hold the components in place so that they make contact with the board.

STEP 5 – Let's get started!



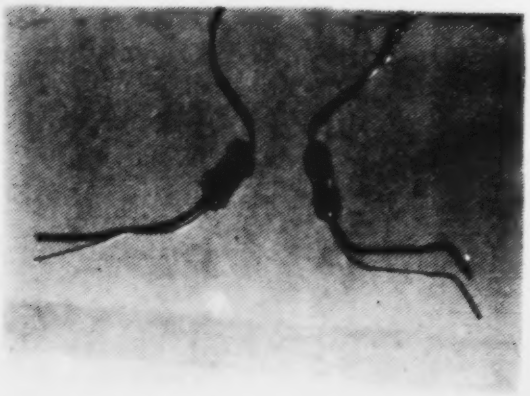
STEP 6 – Locate 2.7K resistors – there are two.



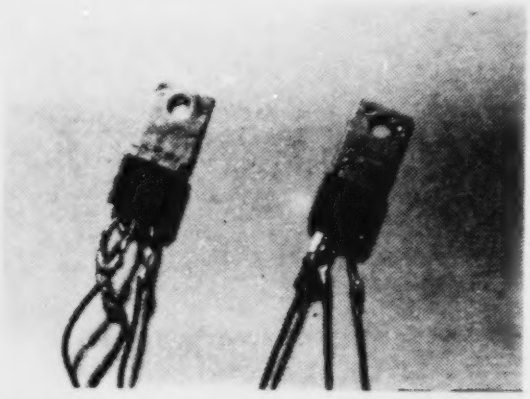
STEP 7 – Clip the resistors in place.

STEP 8 – Find the M resistors (1,000,000), there are two.

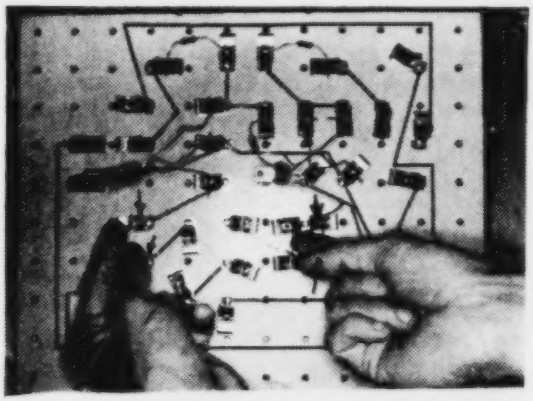
STEP 9 – Clip them in place as shown.



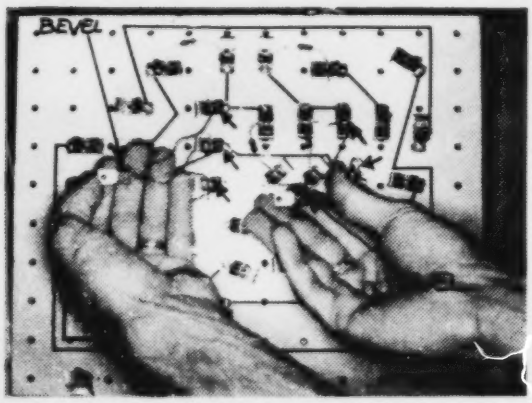
STEP 12 – Locate the remaining two resistors – the 470 ohm resistors.



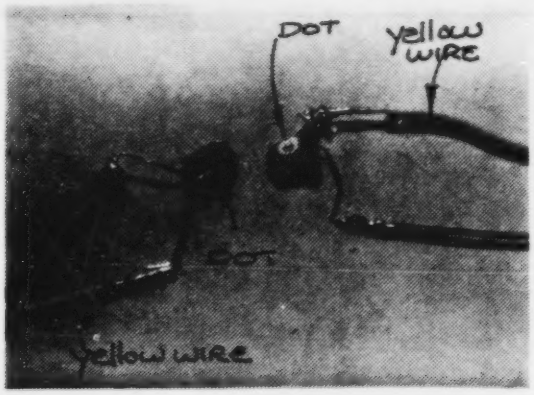
STEP 10 – Locate the SCR's – there are two. Refer to Instructional Objective II if you need help in remembering how they look.



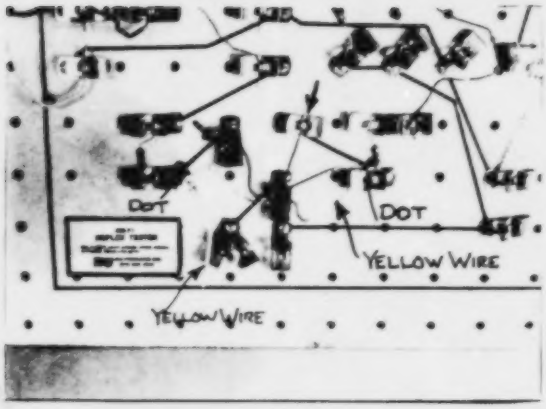
STEP 13 – Clip the 470 ohm resistors in place as shown.



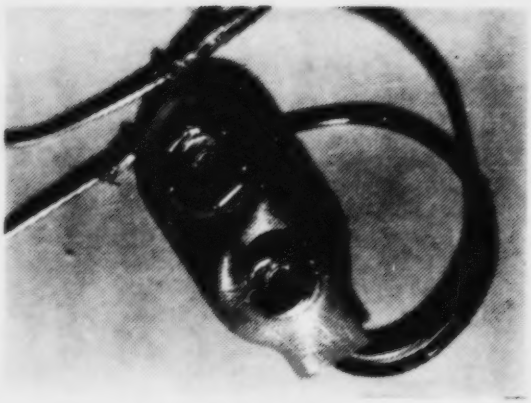
STEP 11 – Clip the SCR's in place. Be sure the beveled edge is exactly as shown.



STEP 14 – Locate the LED'S – there are two.

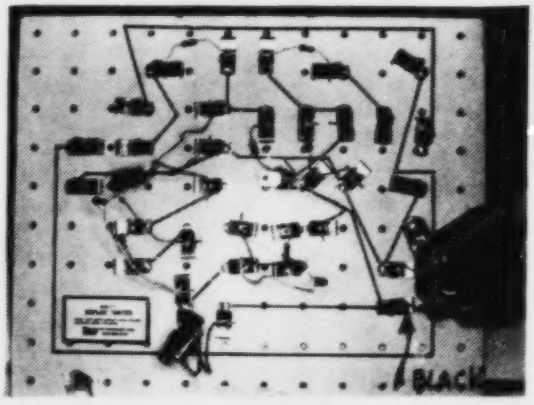


STEP 15 – Clip the LED's into place as shown. Note yellow dot and wire.

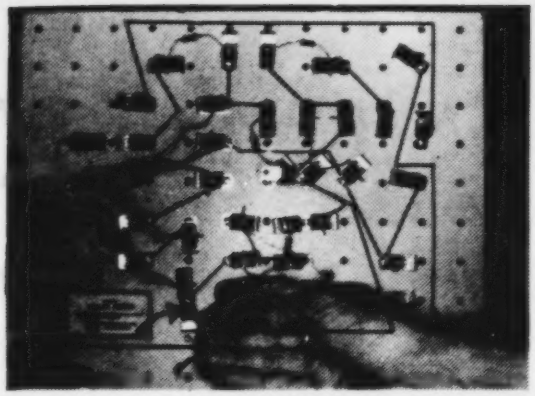


STEP 18 – Locate the battery clip.

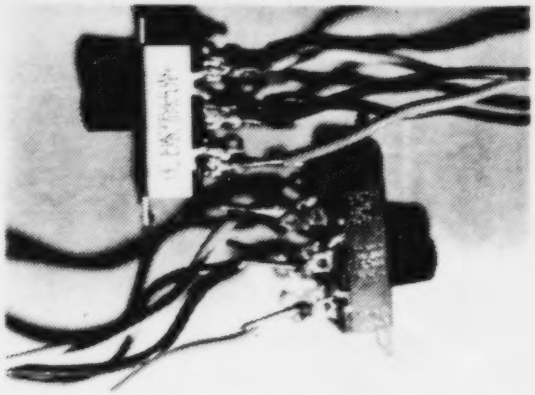
STEP 16 – Locate the SPST switch (reset switch).



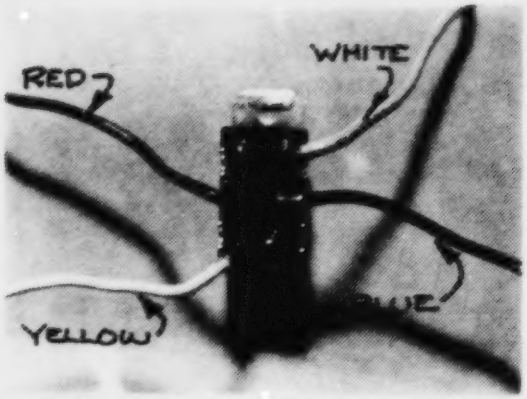
STEP 19 – Attach the battery clip wires as shown. The black wire goes to reset switch.



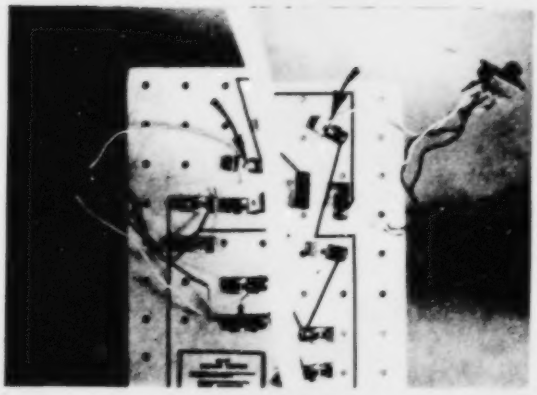
STEP 17 – Clip the switch into place as shown.



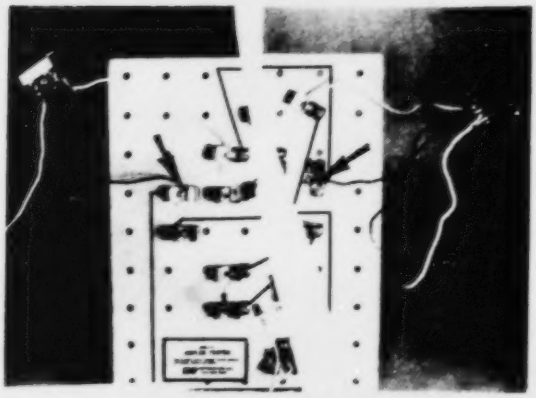
STEP 20 – Locate DPDT switches – there are two.



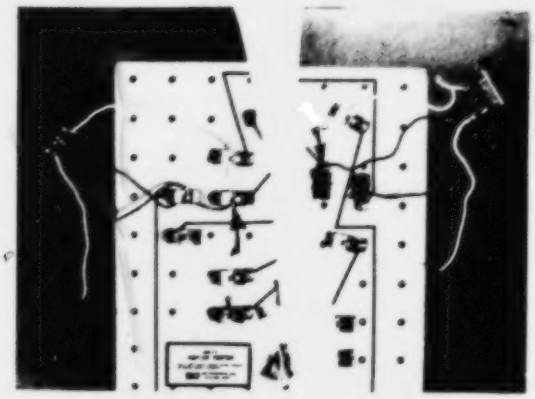
STEP 21 – Notice the colors of the wire attached to the switch.



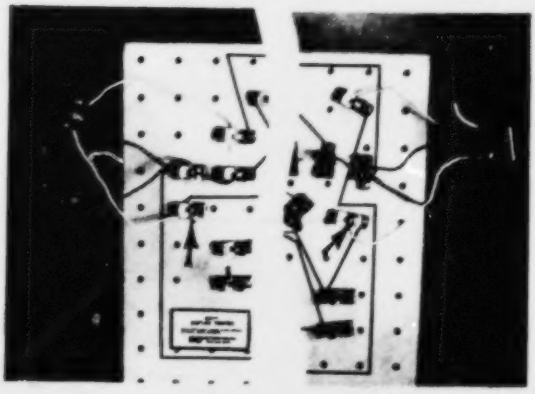
STEP 22 – Clip the yellow wire of both switches into the clip as shown.



STEP 23 – Clip the red wires into clips as shown.



STEP 24 – Clip the blue wire into clips as shown.



STEP 25 – Clip the white wires into clips as shown.

Check Point

Have you used all parts in the project?

Does your project look exactly like the diagram?

Are colored wires in the correct places?

Have your instructor check the placement of your components.

Instructional Objective V

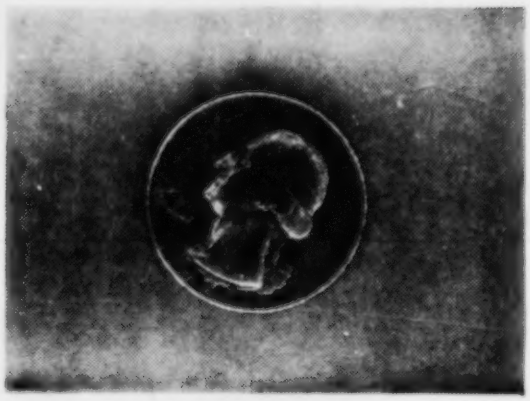
The student will decide what the reflex tester does.

STEP 1 – Obtain a 9-volt battery from your instructor.

STEP 2 – Put battery in place – be sure to notice positive and negative sides.

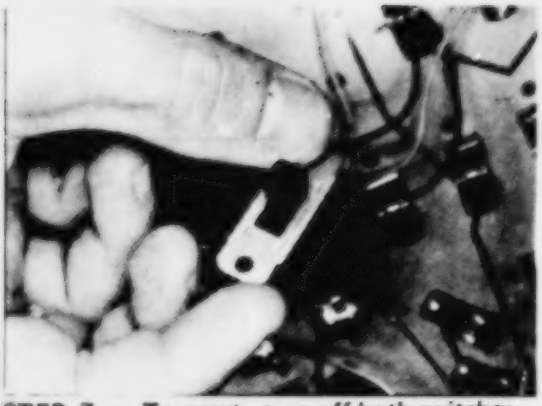
STEP 3 – One person uses switch 1, the other uses switch 2.

STEP 4 – Someone drops a coin.



STEP 5 – When the two players hear it hit, they activate their switch.

STEP 6 – Whoever activates the switch first will light up an LED. The other LED cannot come on.



STEP 7 – To reset, turn off both switches, then turn switch 3 on and off once.

STEP 8 – You can make up your own game – or answer questions. Use your imagination.

Check Point

Did your project work?

Check all components to see if they are located correctly and securely.

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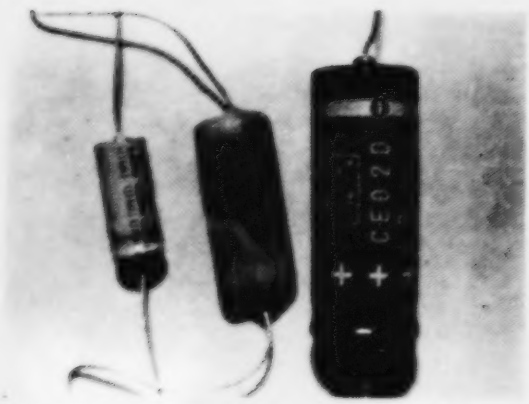
Instructional Objective IV

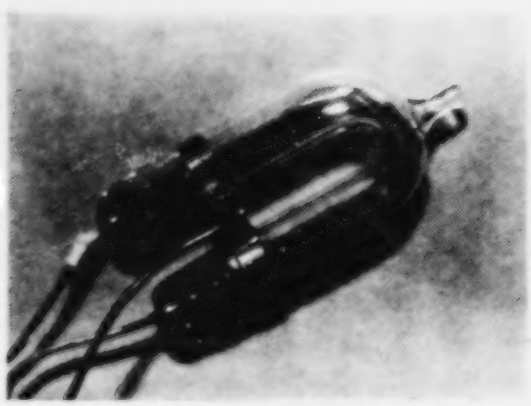
The student will assemble the variable strobe light.



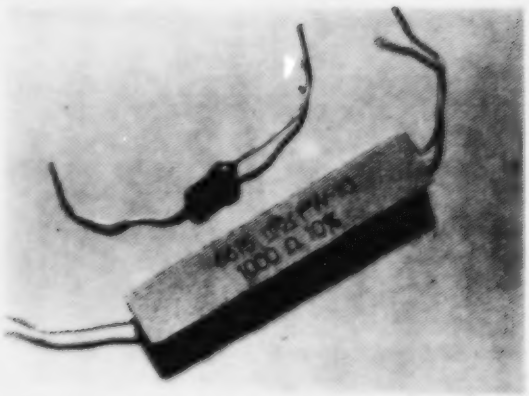
STEP 1 – These are the parts in project 840-SL.

Parts List

C_1 = 150V capacitor, 4.7uf
C_2 = 250-350V capacitor, 20uf
C_3 = 200V capacitor, .47uf

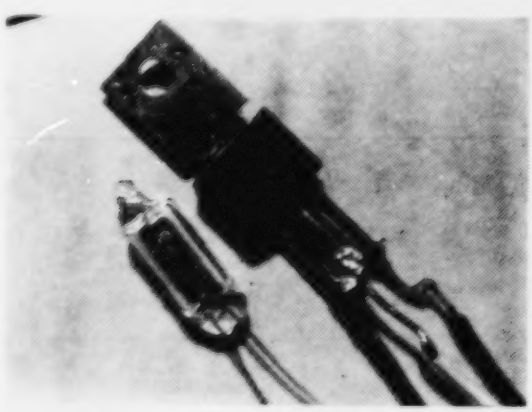


I_2 = 5 watt xenon flashtube

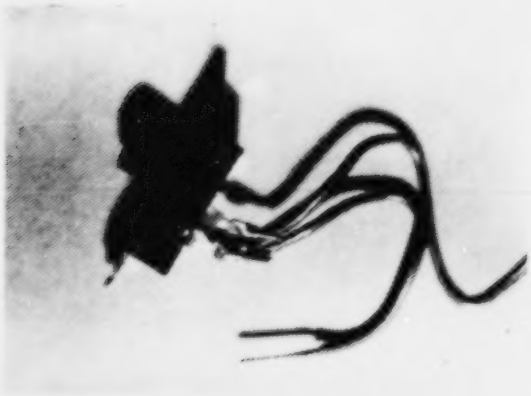


R_3 = 47K resistor
R_1 = 1K to 2.5K resistor

T_1 = trigger transformer
D_1 = 1 amp diode
D_2 = 1 amp diode

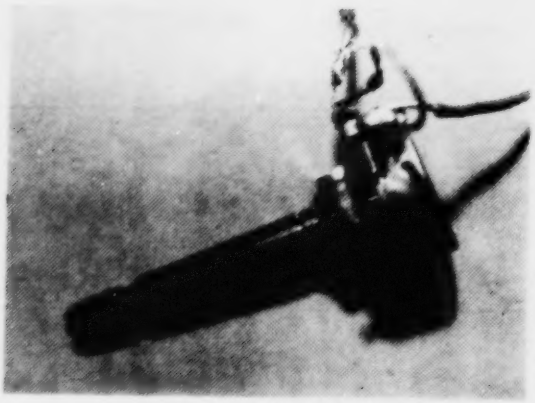


SCR= C 106B1
I_1 = Ne 2 neon lamp

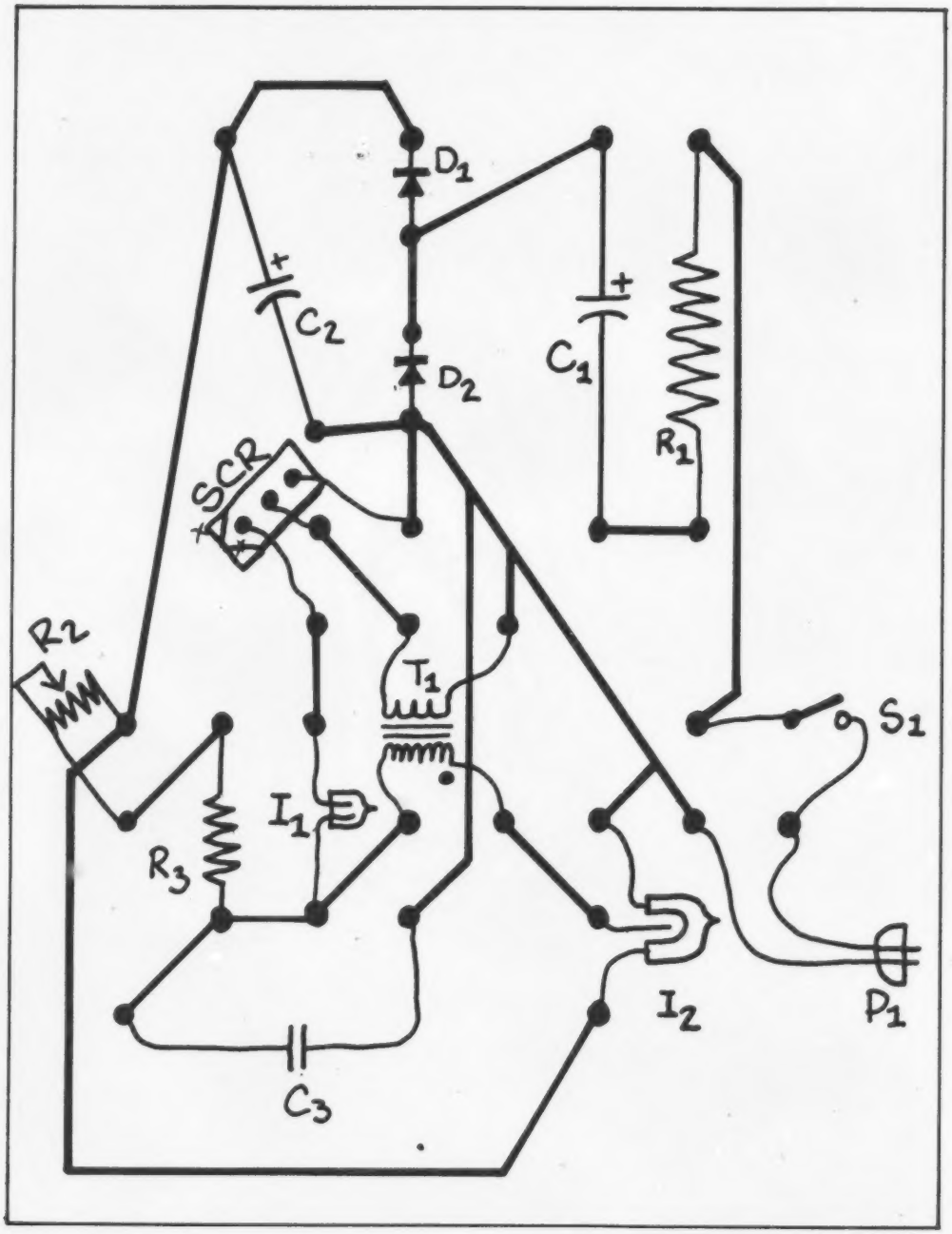


S_1 = SPST switch

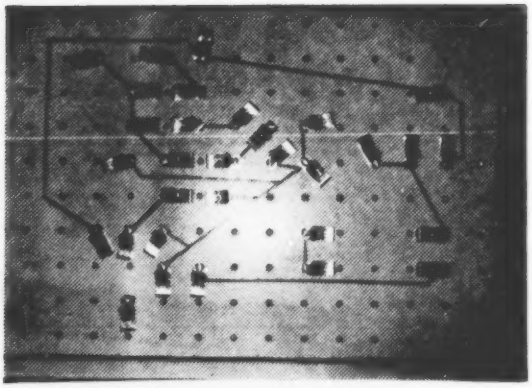
P_1 = AC line cord



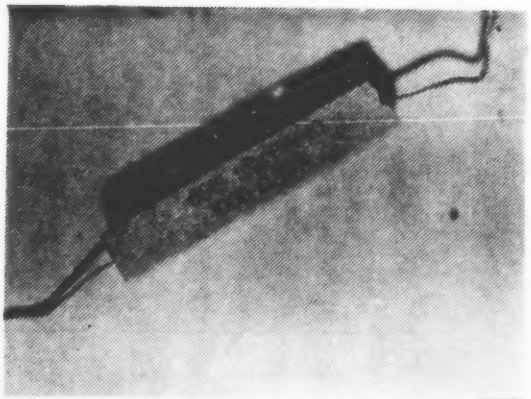
R_1 = 500K potentiometer



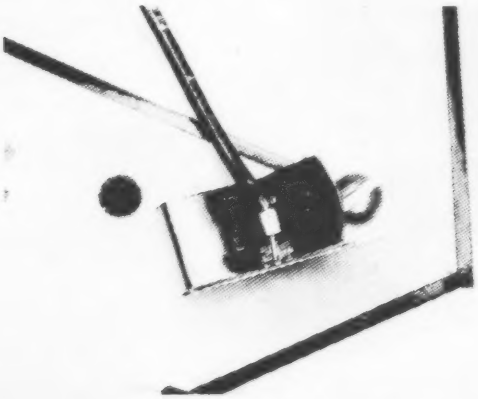
STEP 2 – This is the schematic for project 840-SL. This means a picture of where all the parts are located in relation to one another.



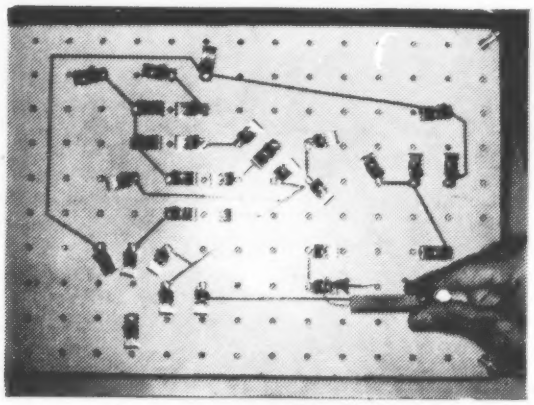
STEP 3 – This is the circuit board. Locate one like it in your project.



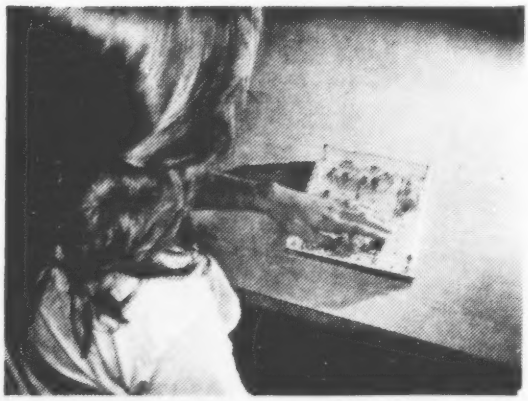
STEP 6 – Locate 1 K 10 watt resistor. K means multiply by 1000, 1 x 1000 = 1000.



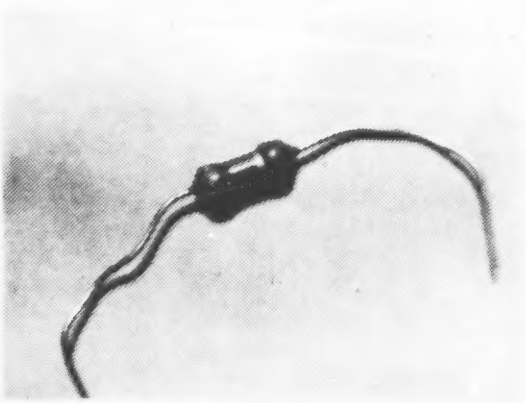
STEP 4 – Notice the spring clips located on the board. These will be used to hold components in place so that they make contact with the circuit board.



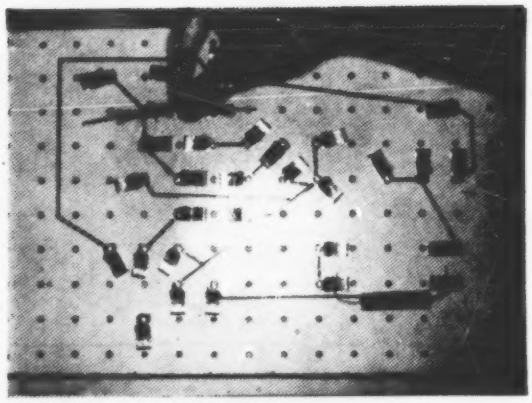
STEP 7 – Clip 1K resistor into place.



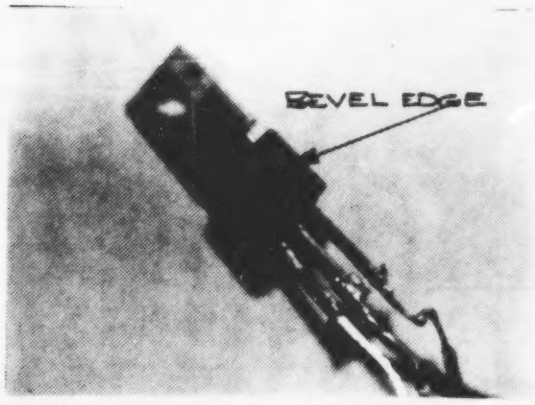
STEP 5 – Let's get started!



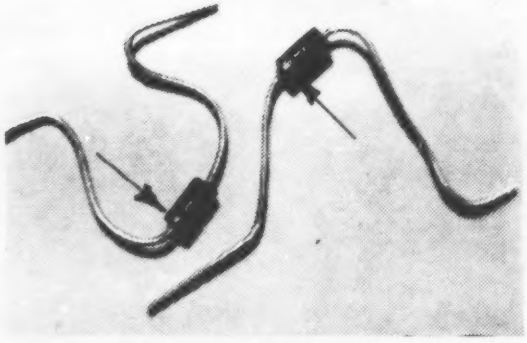
STEP 8 – Locate 47K resistor.



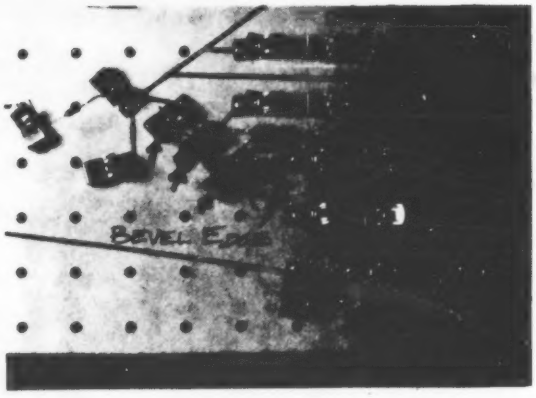
STEP 9 – Clip resistor into place as shown.



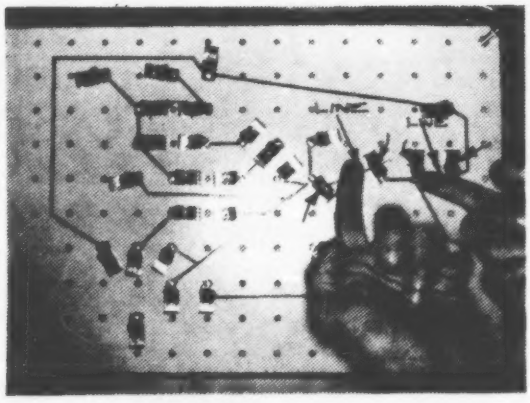
STEP 12 – Locate SCR. Notice one edge seems to be cut off.



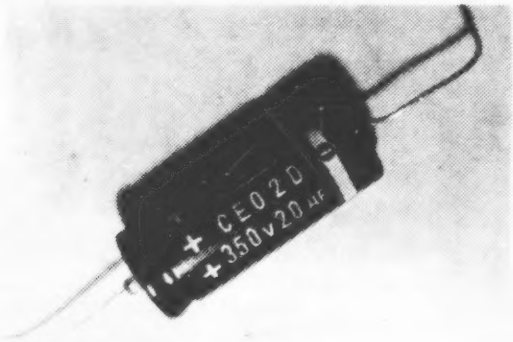
STEP 10 – Locate two diodes. Notice the silver lines on them.



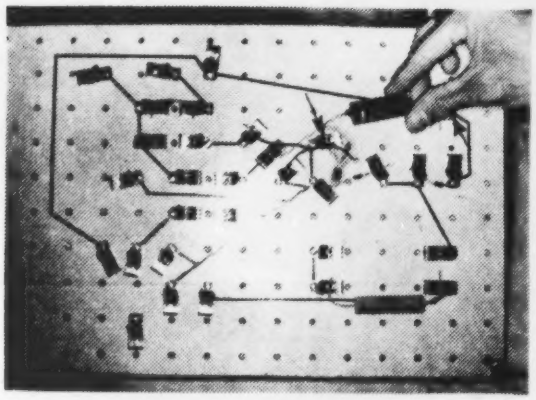
STEP 13 – Clip SCR into place. Be sure beveled edge is correctly located.



STEP 11 – Clip diodes into place. Be sure lines are in right position.

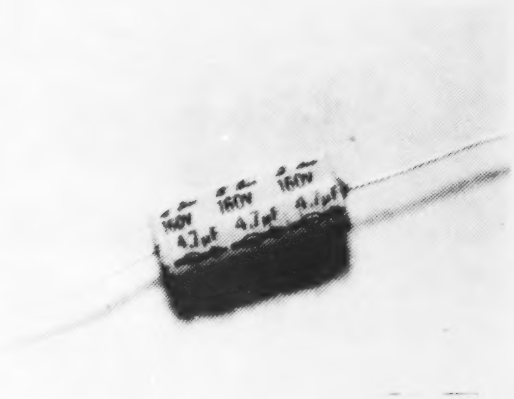


STEP 14 – Locate 20uf capacitor. It will have the number printed on the side.

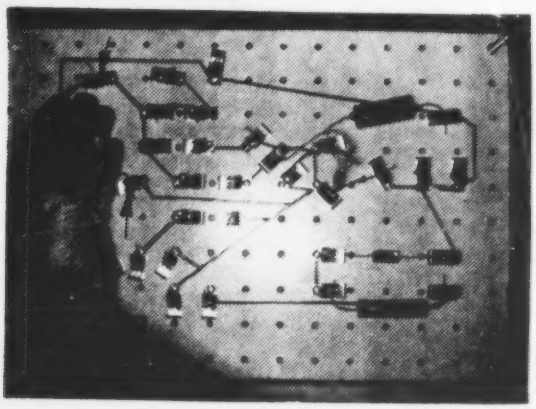


STEP 15 – Clip 20uf capacitor in place.

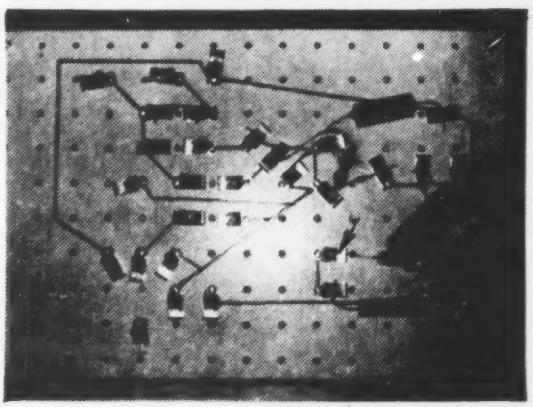
STEP 18 – Locate .47uf capacitor. Be sure you haven't mixed up the 4.7 and .47 capacitors.



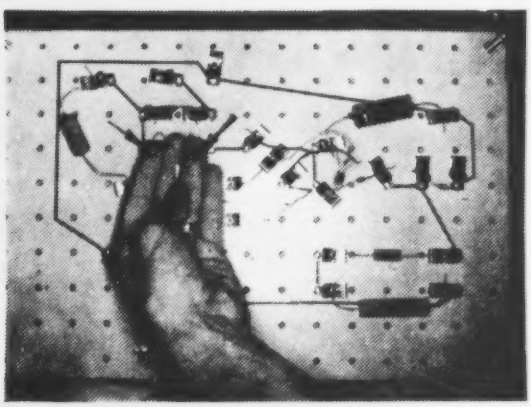
STEP 16 – Locate 4.7uf capacitor.



STEP 19 – Clip capacitor in place as shown.

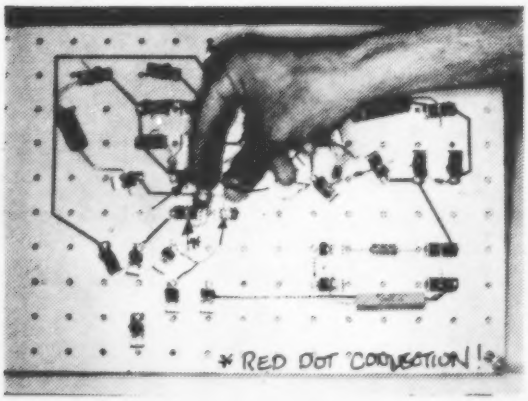


STEP 17 – Clip capacitor in place.

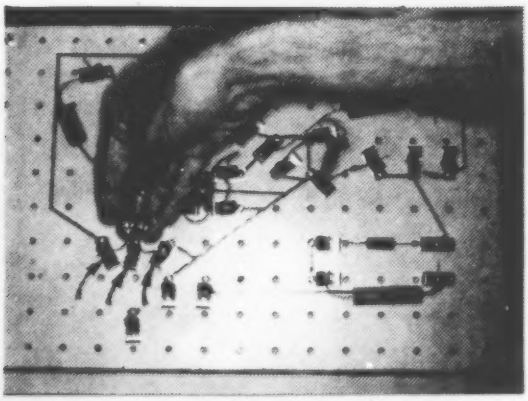


STEP 20 – Locate neon lamp and clip in place.

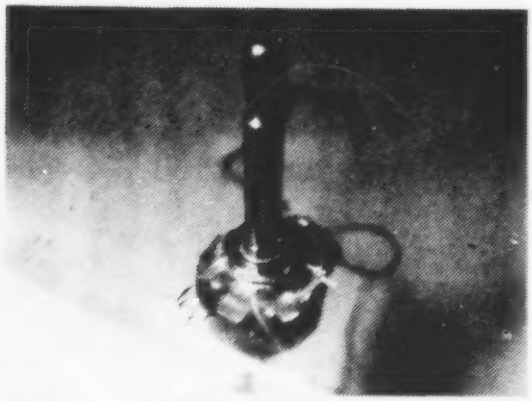
STEP 21 – Locate trigger transformer. Notice the red dot.



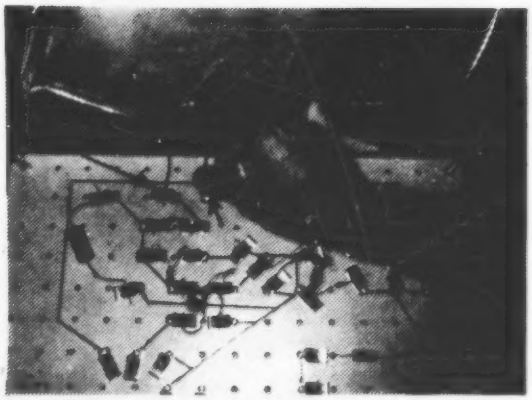
STEP 22 – Clip transformer in place.



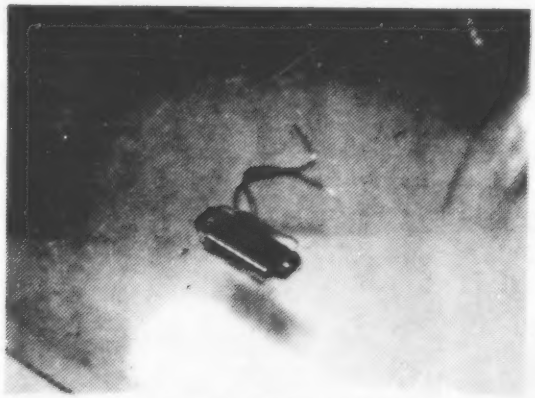
STEP 23 – Locate flashtube and clip in place.



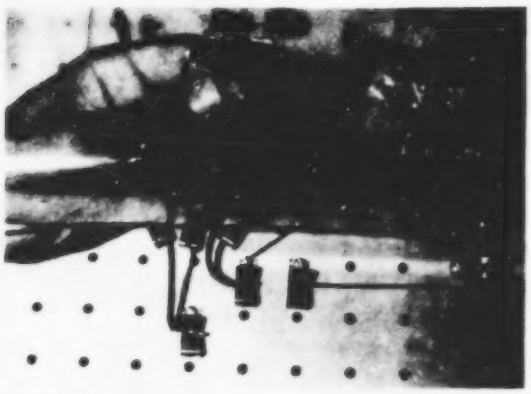
STEP 24 – Locate potentiometer in plastic cover.



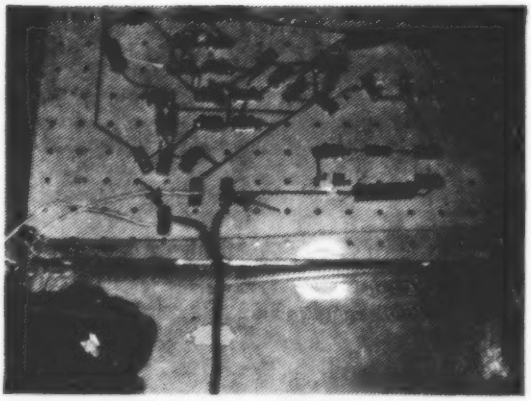
STEP 25 – Clip wire from potentiometer into place.



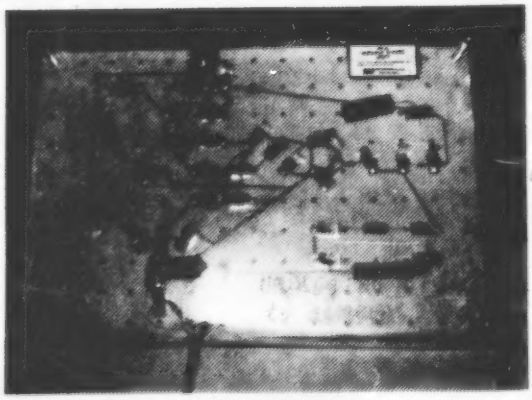
STEP 26 – Locate SPST switch in plastic cover.



STEP 27 – Clip wires into place as shown.



STEP 28 – Insert line cord through the plastic cover and clip in place.



STEP 29 – Place the plastic cover in place as shown.

Check Point

Did you use all parts?

Are all parts correctly placed? Check to be sure.

Have your instructor check the placement of your components.

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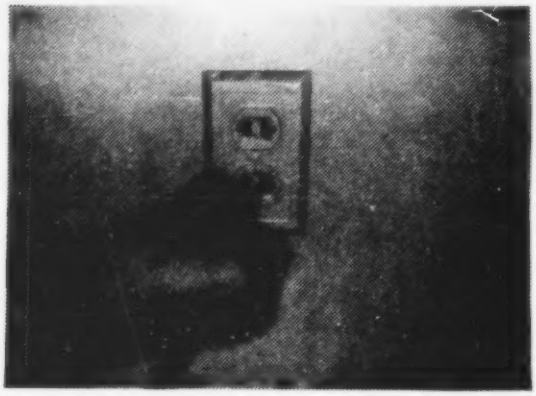
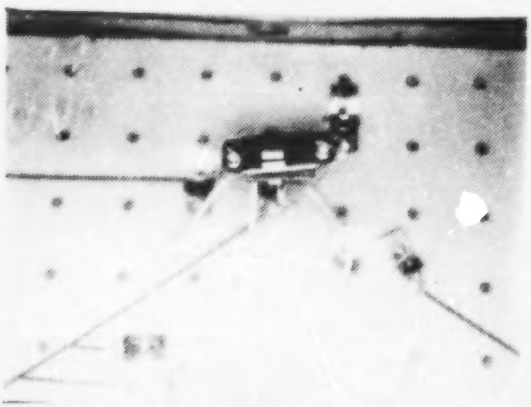
Instructional Objective V

The student will decide what the variable strobe light does.



STEP 1 – Plug your project into a wall socket.



STEP 2 – Switch is located in cover.

STEP 3 – Turn the potentiometer to adjust the number of flashes per second.

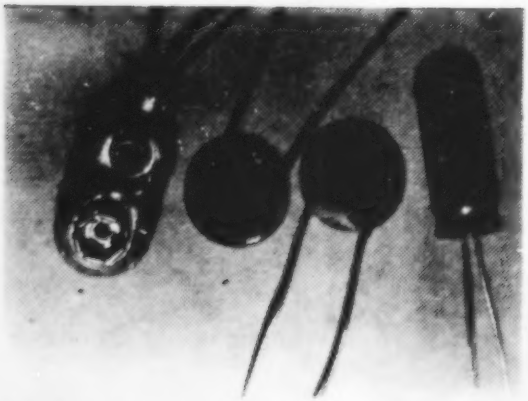
Check Point

Did the strobe light work?

Did you have everything connected correctly?

Instructional Objective IV

The student will assemble the whooper alarm.

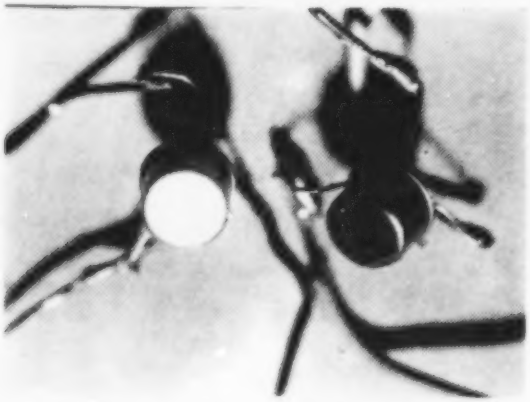


STEP 1 — These are the parts in project 850-WH.

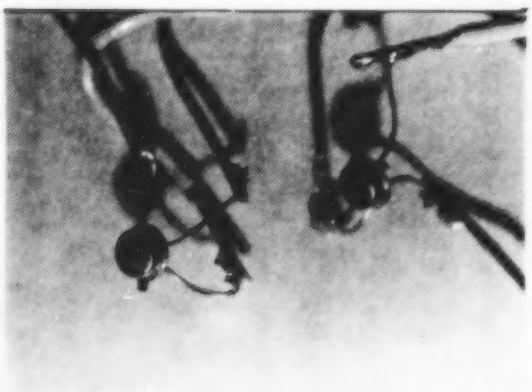
Parts List

B_1 = 9v battery clip
C_1 = .05uf capacitor
C_2 = .05uf capacitor
C_3 = 100uf capacitor

Q_1 = plastic transistor
Q_6 = plastic transistor

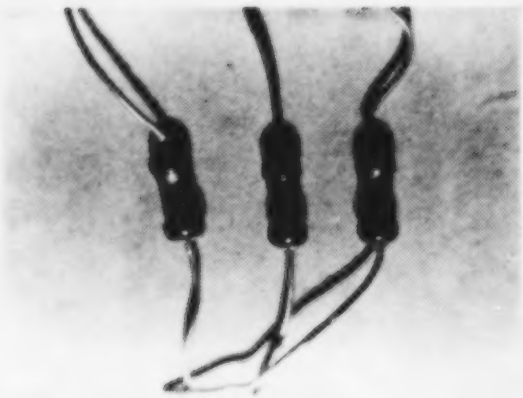


Q_2 = large metal transistor
Q_5 = large metal transistor

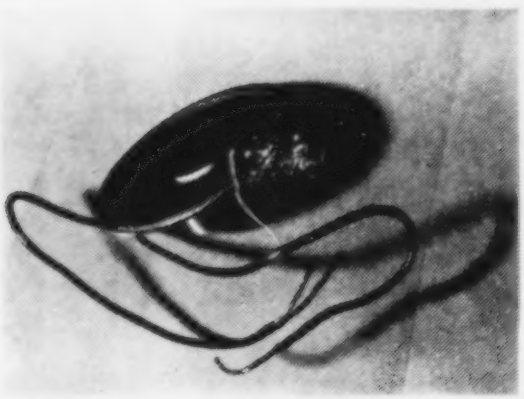


Q_3 = small metal transistor
Q_4 = small metal transistor

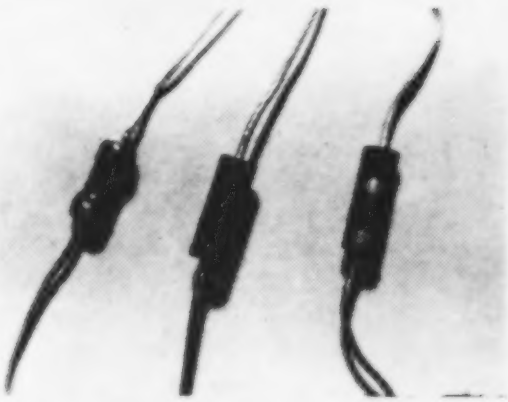
R_1 = 2.2K resistor
R_2 = 6.8K resistor
R_3 = 6.8K resistor



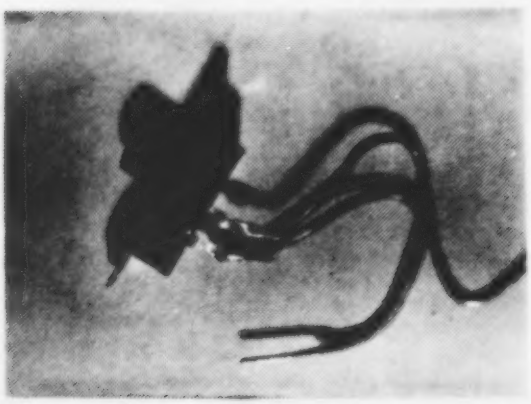
R_4 = 1K resistor
R_6 = 1K resistor
R_5 = 22K resistor



SPK = 8 ohm speaker



R_7 = 100 ohm resistor
R_8 = 10K resistor
R_9 = 10K resistor



S_1 = SPST slide switch

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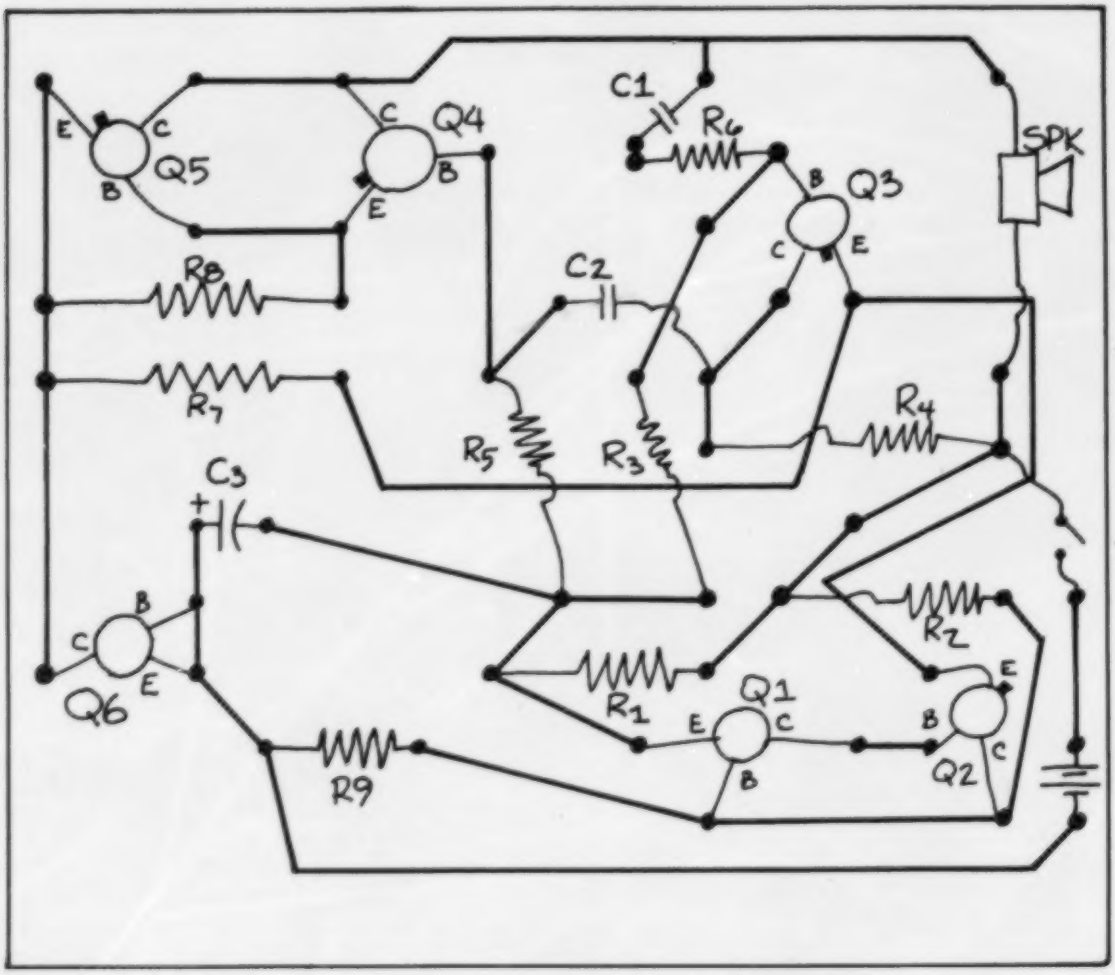
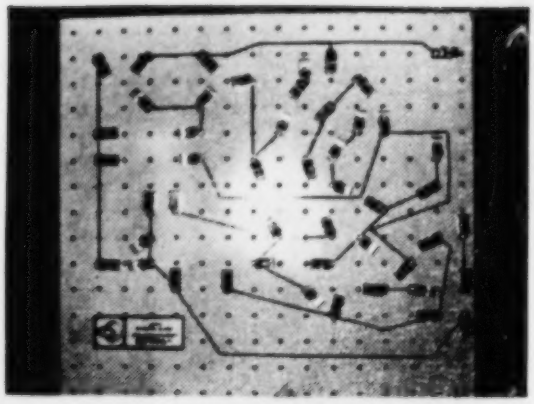
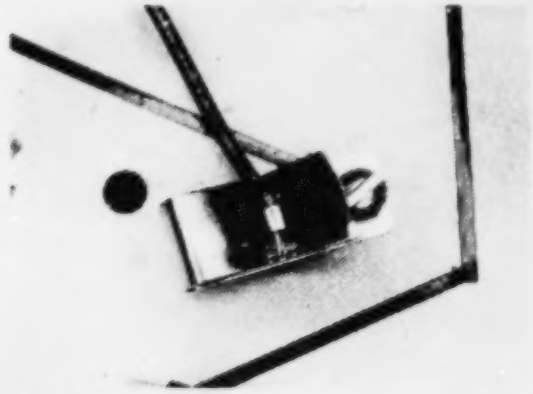


STEP 2 – This is the schematic for project 850WH. This means a picture of where all the parts are located in relation to one another.

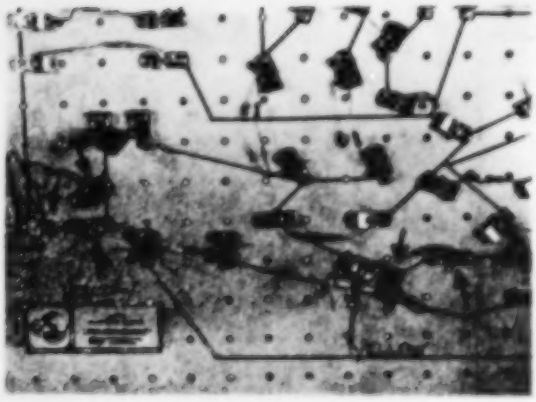


STEP 3 – This is the circuit board. Find one like it in your project.

STEP 6 – Locate the two plastic transistors.

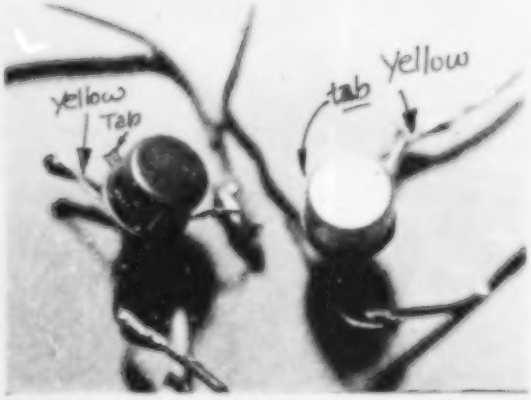


STEP 4 – Notice the spring clips located on the board. These will be used to hold the components so that they make contact with the circuit board.

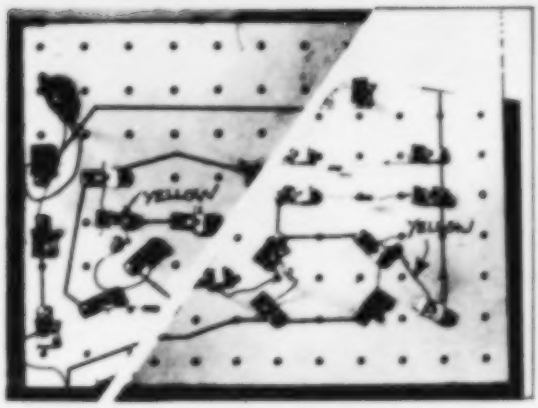


STEP 7 – Clip them in place as shown. Note the yellow wire.

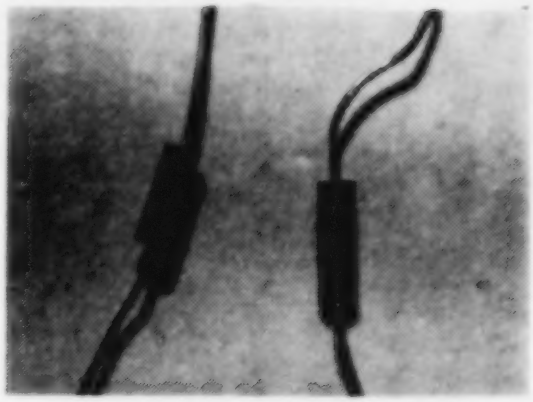
STEP 5 – Let's get started!



STEP 8 – Locate the two large metal transistors. Note the yellow wire.

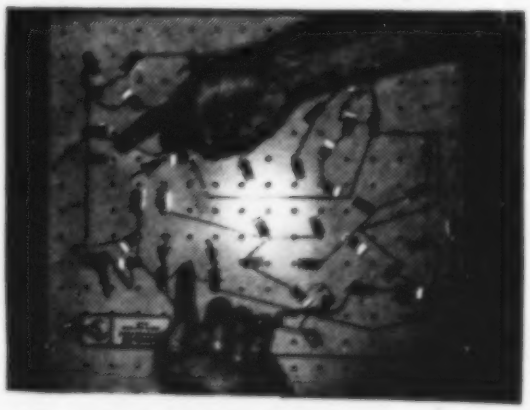


STEP 9 – Clip them in place as shown.

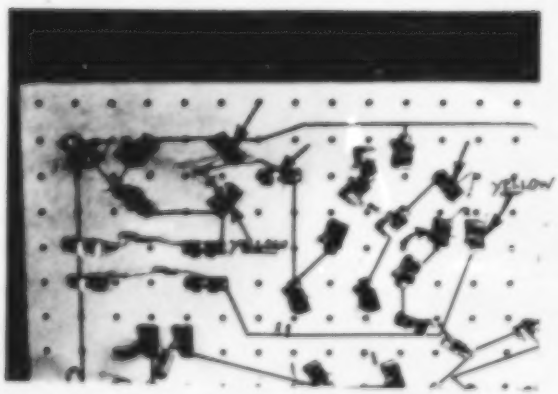


STEP 12 – Locate 10K resistors. K means multiply by 1000. 10 x 1000 = 10,000.

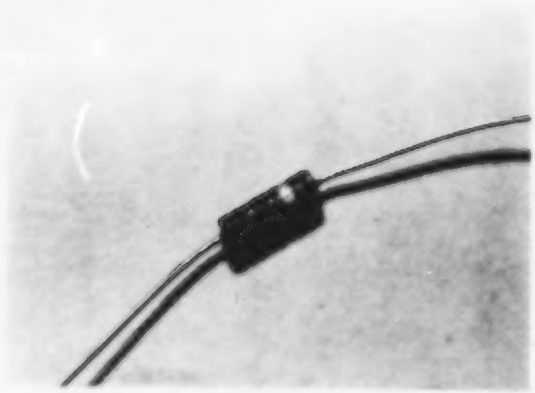
STEP 10 – Locate the two small metal transistors.



STEP 13 – Clip them in place.



STEP 11 – Clip them in place as shown. Note the yellow wire.



STEP 14 – Locate 2.2K resistor.

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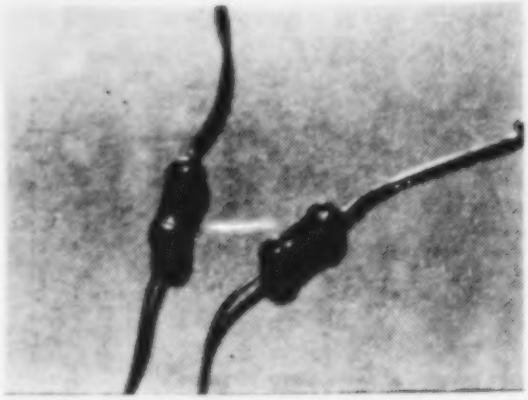
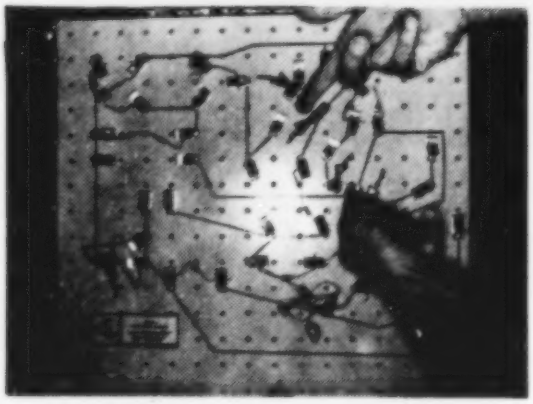
STEP 15 – Clip it in place.

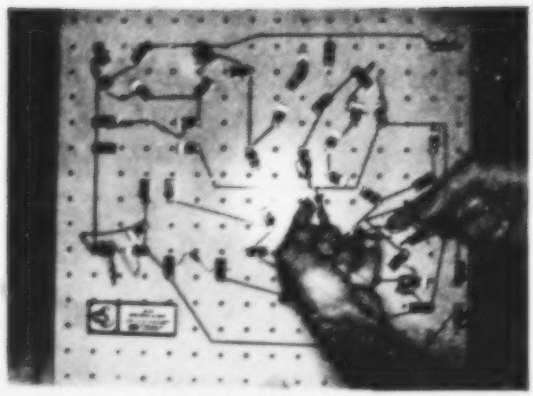
STEP 18 – Locate 1K resistors (two of them).



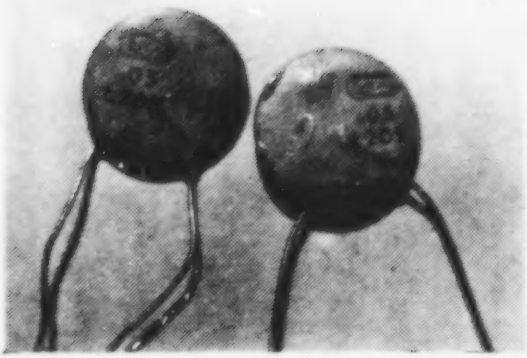
STEP 16 – Locate 6.8K resistors (two of them).



STEP 19 – Clip into place as shown.



STEP 17 – Clip in place as shown.



STEP 20 – Locate .05uf capacitor (two of them).

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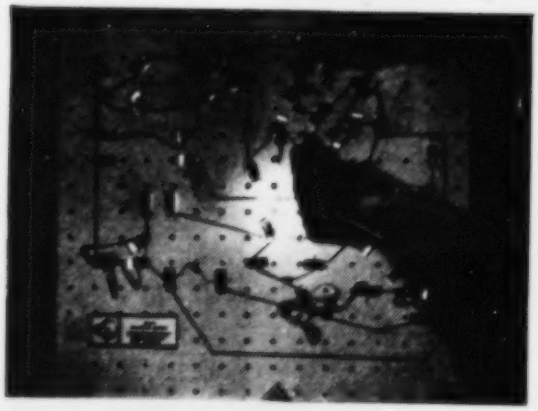
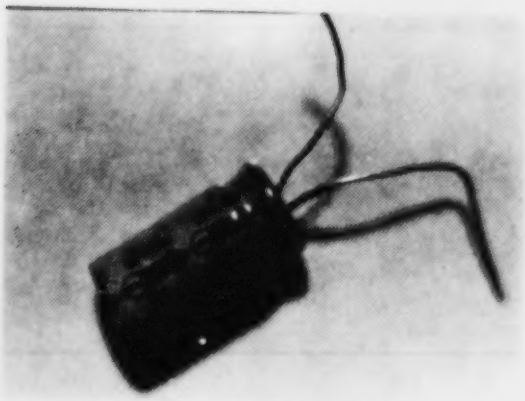
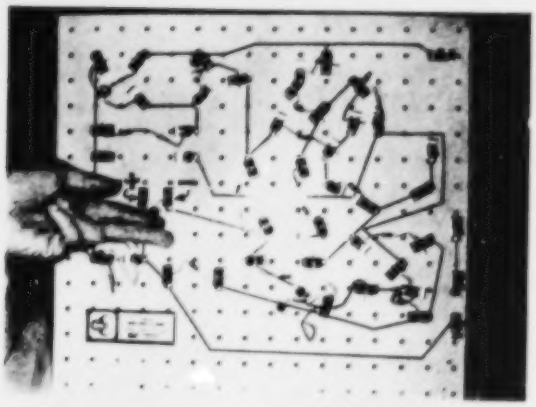


STEP 21 – Clip into place as shown.

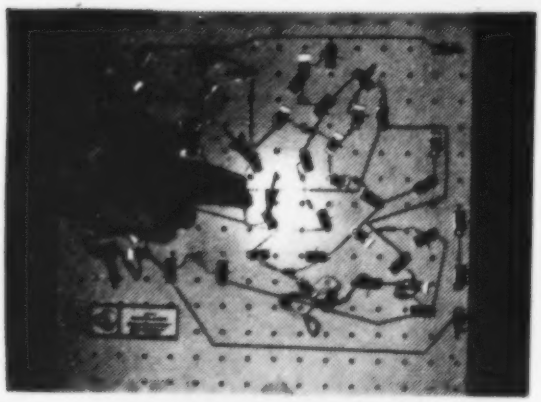


STEP 24 – Locate 100uf capacitor.

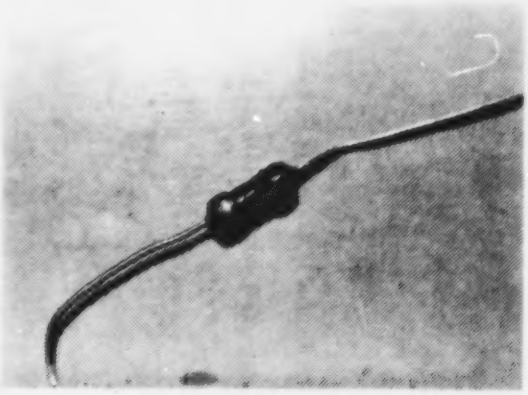
STEP 22 – Locate 22K resistor.



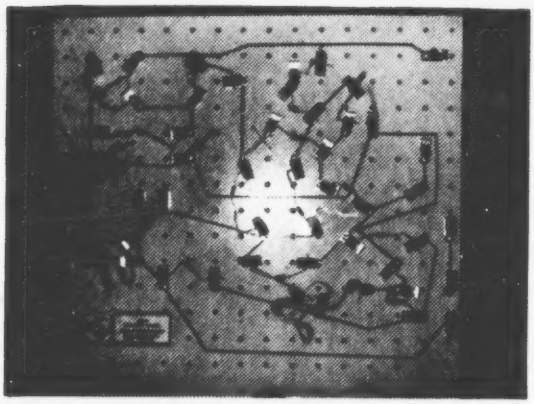
STEP 25 – Clip in place as shown. Note + side.



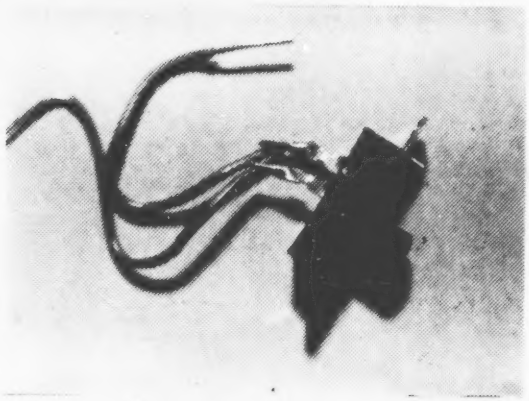
STEP 23 – Clip in place as shown.



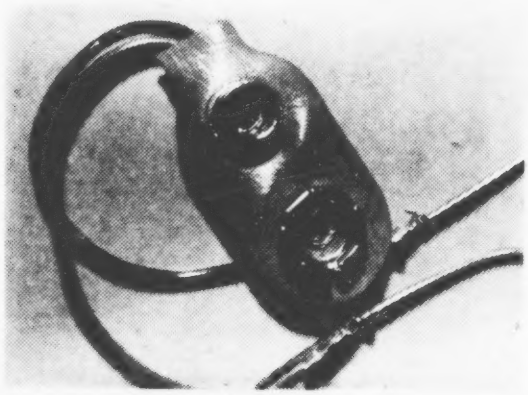
STEP 26 – Locate 100 ohm resistor (100Ω).



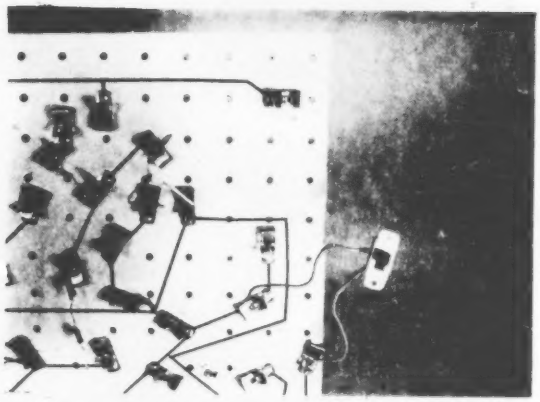
STEP 27 – Clip in place as shown.



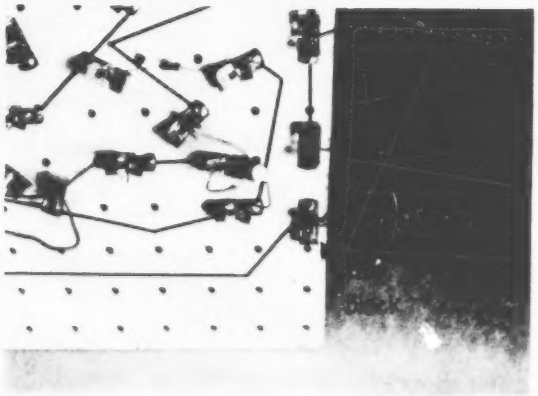
STEP 30 – Locate SPST switch.



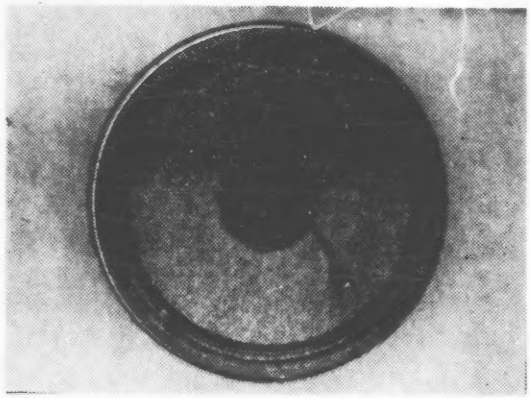
STEP 28 – Locate battery clip.



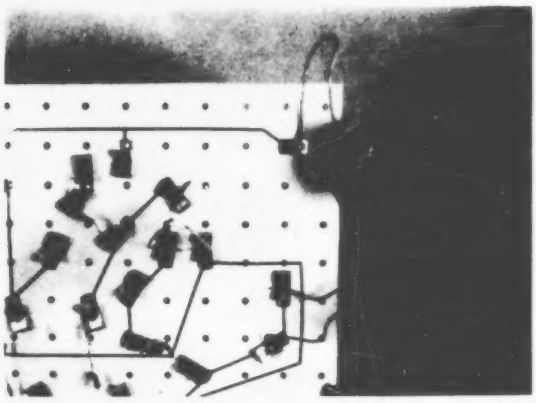
STEP 31 – Clip in place as shown.



STEP 29 – Clip in place as shown. Note wire colors.



STEP 32 – Locate speaker.



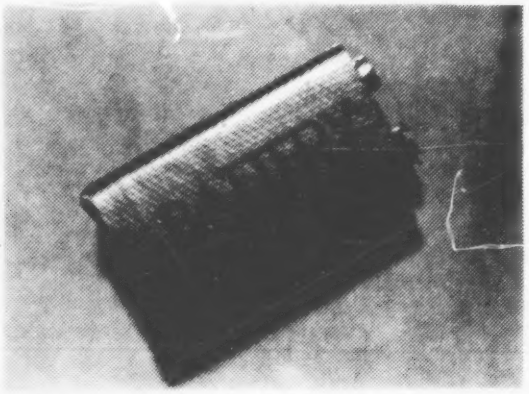
STEP 33 – Clip wires in place as shown.

Check Point

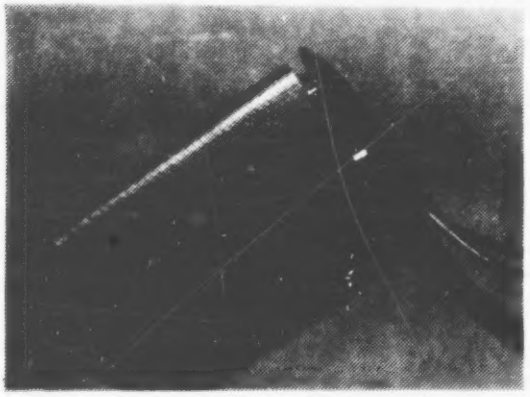
Did you use all parts?
Are parts located correctly?
Are parts fastened so they are secure?
Have your instructor check the placement of your components.

Instructional Objective V

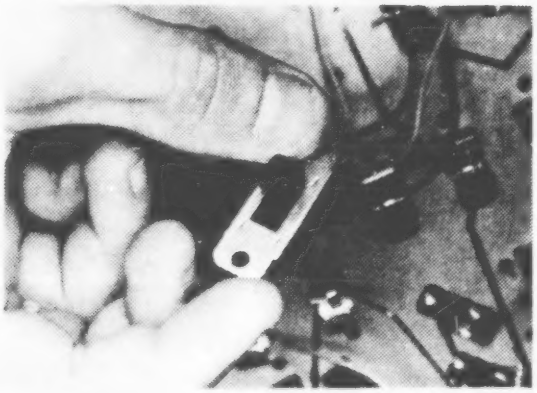
The student will decide what the whooper alarm does.



STEP 1 – Obtain a 9-volt battery.



STEP 2 – Connect the battery.



STEP 3 – Slide the button on the switch and see what happens!

Check Point

Did it work?
Was everything connected properly?

003.161-014 ELECTRONICS TECHNICIAN (profess. & kin.)

Applies electronic theory, principles of electrical circuits, electrical testing procedures, engineering mathematics, physics, and related knowledge to lay out, build, test, troubleshoot, repair and modify developmental and production electronic equipment, such as computers, missile-control instrumentation, and machine tool numerical controls: Discusses layout and assembly problems with ELECTRONICS ENGINEER (profess. & kin.) and draws sketches to clarify design details and functional criteria of electronic units. Assembles experimental circuitry (breadboard) or complete prototype model according to engineering instructions, technical manuals, and knowledge of electronic systems and components and their functions. Recommends changes in circuitry or installation specifications to simplify assembly and maintenance. Sets up standard test apparatus or contrives test equipment and circuitry, and conducts functional, operational, environmental, and life tests to evaluate performance and reliability of prototype or production model. Analyzes and interprets test data. Adjusts, calibrates, alines, and modifies circuitry and components and records effects on unit performance. Writes technical reports and develops charts, graphs, and schematics to describe and illustrate systems operating characteristics, malfunctions, deviations from design specifications, and functional limitations for consideration by professional engineering personnel in broader determinations affecting systems design and laboratory procedures. May operate bench lathes, drills, and other machine tools to fabricate nonprocurable items, such as coils, terminal boards, and chassis. May check out newly installed equipment in airplanes, ships, and structures to evaluate system performance under actual operating conditions. May instruct and supervise lower grade technical personnel. May be designated according to specialization in electronic applications as COMPUTER-LABORATORY TECHNICIAN (profess. & kin.); DEVELOPMENT-INSTRUMENTATION TECHNICIAN (profess. & kin.); ELECTRONIC-COMMUNICATIONS TECHNICIAN (profess. & kin.); ELECTRONIC TECHNICIAN, NUCLEAR REACTOR (profess. & kin.); ENGINEERING-DEVELOPMENT TECHNICIAN (aircraft-aerospace mfg.); SYSTEMS-TESTING LABORATORY TECHNICIAN (profess. & kin.).